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THE APPRAISAL OF REAL ESTATE

LAND ECONOMICS SERIES

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New York
THE MACMILLAN COMPANY
1924

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Set up and electrotyped.
Published September, 1924.

6085
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PRINTED IN THE UNITED STATES OF AMERICA

PREFACE

Real estate appraising is now looked upon as scientific and professional in its character. Very little literature has appeared which covers the specific field, and the present volume is presented in an effort to clarify thought in connection with appraisal procedure.

The thought has been to give particular stress to the organization of the subject, the development of a set of principles, and the inclusion of all phases of the problem and all points of view. The latter desire was impossible, inasmuch as time did not permit the insertion of three important chapters which had originally been planned:

The Appraisal of Industrial Property.

The Appraisal of Value Impairments and Benefits.

Real Estate Consulting Problems.

It is to be hoped that these subjects can be covered in a revision later.

The author desires to express his appreciation to all who have assisted, particularly Dr. Richard T. Ely, who is editing the series of publications of which this is a unit; Mr. Herbert U. Nelson, and Mr. Ernest M. Fisher, both of the National Association of Real Estate Boards, who gave much advice and helpful criticism.

The author's father, Mr. William H. Babcock, has contributed greatly. Many of the concepts appearing in these pages are his and to him the author desires to express genuine gratitude. Without his assistance the book would have been impossible.

Professor James W. Glover of the University of Michigan very courteously permitted the reproduction of tables of present worths from his noteworthy volume of *Compound Interest Functions,* and the author is truly appreciative.

FREDERICK M. BABCOCK.

Evanston, Illinois, July, 1924.

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CHAPTER I

WHAT AN APPRAISAL IS

The appraisal of real property is a specialized field of the general real estate business. As a specialty it includes the estimating of the value of land, buildings, parts of buildings and leaseholds.

Opinions of real estate value have become marketable in the business world. The reasons which caused the real estate appraiser's estimates to command fees are rather apparent. The valuation service rendered by tax assessors to the community had to command salaries. The valuations made for all legal purposes gave hazard to the valuator's reputation and introduced an element of responsibility. As properties became more complex and their values harder to determine, the importance of the "off-hand" appraiser diminished, leaving a relative scarcity of persons with the requisite skill and experience to appraise properly. Then the very importance of the uses to which valuation reports were put in the conduct of business operations gave the appraiser's service a marketable value.

Expert opinion of real estate value is predicated upon adequate evidences of value. The very essence of the evaluation process is found in a rendered proof of the value estimate. It is true that final and absolute proofs of value are never possible and that the process consists of supplying proofs for as large a portion as possible of the data upon which the value opinion is based and the utilization of correct processes of thought and logic in arriving at the estimate. The student of appraisal methods is therefore concerned with the following:

1. The amount and character of data which are necessary as evidence of value, and the method of testing such data.

2. The processes of logic which should be used in building the data into value estimates.

This is simply the application of the scientific method of analysis. Because it is obvious that there is no absolute iron-clad method of computing real estate values, and because values are a social phenomenon dependent upon human behavior, are not reasons why empirical methods would be superior. It should be possible to discover the principles which tend to govern values and to determine upon processes of thought which will somewhat limit the zone of error in valuation estimates. The development of these principles and methods must be done in relation to the uses to which opinions of real estate value are put.

THE OCCASIONS FOR APPRAISING

Appraising is not simply the placing of a value estimate upon a property. It is more inclusive. It involves a study of the correct use of ground. The appraiser's service and functions are semi-professional in that he is a consultant and gives his opinions of values as incidental and supplementary to his analysis of correct use of ground. His services, thus conceived, are used on a number of occasions, notable among which are the following:

Sale or Purchase.—An appraisal report to be used in connection with a contemplated sale or purchase of a real property is not infrequently the turning point in the negotiated transaction. True, the valuator may not have been asked for his frank opinion of the sale and he may not even know that a sale is contemplated. Nevertheless, he is asked to furnish a statement which may be the very factor that will create the decision to buy or sell. The appraiser's function is clear-cut in such cases. He is to render an unbiased opinion or estimate of the fair cash market value of the property and to substantiate his value estimate in his report.

Reorganizations, Receiverships, Mergers, etc.— Appraisals made to assist in such business operations as reorganizations, receiverships, mergers, etc., are similar to the services of the auditor who makes an inventory. Usually such an appraisal is a special case of appraising for sale or purchase of real estate. When a corporation and its business is purchased, dissolved or passes through bankruptcy, some determination of the value of its assets is required, including the real estate items. While as a generality one might conclude that the purpose of a valuation might have no bearing upon the value estimate and that knowledge of the purpose of the appraisal can only impair the valuator's judgment by prejudicing him, still there are occasions when such knowledge should be a part of the valuator's data. In these corporation appraisals value estimates indicating the values which properties have to the particular owners may be included quite correctly, and should frequently be given in addition to the sale values in a general market. However, it is frequently true that the valuator, because of his lack of knowledge of the operations of the business as such, is in a rather poor position to render such estimates and his report should be very clear in presenting the foundation for conclusions concerning such values. In any event his report should call attention to the existence of such a value, even though an actual estimate is not included.

Security for Real Estate Loans.—Where a loan or real estate mortgage is accepted the extent of the collateral security is determined by the appraised value of the property. The appraiser is asked to render an estimate of fair cash market value. The mortgagor may employ him, in which case it is usually the mortgagor's intention to secure as high a valuation as possible in order to enable him to secure as large a loan as possible, and in general the mortgagor does not anticipate a foreclosure. If the trustee or mortgagee is the appraiser's employer, the valuator is asked to pass upon the expediency of accepting the property as security. The significant thing in respect to such an appraisal is that no matter which is the employer, the appraiser's responsibility is to neither. The reciprocal relationship which the mortgaging transaction presupposes can have nothing to do with the sale value of the property. Appraisers are examiners and their responsibility is to fact and accuracy, not to the deal under consideration. Usually an appraiser is aware that his report is to be used for loaning purposes, but it is not necessary, nor is it desirable, that he know the size of the loan asked. If the valuation is for a loan, the appraiser may be especially explicit in showing the probable future of the property. The permanence of the district, the remaining useful life of the structure, and the proportion of the total value which can be assumed to be part of the land rather than part of the destructible building, are considerations which he will very thoroughly analyze.

It is a frequent custom to tell valuators the extent of the loan contemplated and to ask them to report directly upon the expediency of its acceptance, but such a practice does not develop the maximum service offered by valuators and precludes much of the safety which lenders should have. Less experienced valuators are prone to feel, in spite of their better judgment, that an anticipated loan cannot be far out of the correct relationship to the fair value of the property, and the very purpose for which the appraisal opinion is desired is not generally accomplished.

To Determine the Expediency of the Purchase of a Real Estate Bond Issue.—Investment houses, having been asked to participate in the marketing of a real estate loan, request valuation reports. Such a report usually serves two purposes: In the first place, it assures the investment house that the loan is secured. In the second place, the appraisal report can be published as a part of the bond circular and used generally as a sales argument in selling the bonds.

To Determine Rental Value.—Appraisers are sometimes employed to determine for an owner or tenant the amount of rent which is warranted for a space or for a location. Such valuations are usually required by retail merchants who are negotiating for space. The function of the appraiser is to determine upon the annual rental warranted. Pedestrian traffic, character of people, display, the store itself, and the permanence or future of the store site, will be investigated, and some thought will be given to the length of lease proposed. This is a case in which the valuator should know all about the contemplated use of the site, and little or nothing is gained by withholding such facts from him.

To Distribute Rental Value to the Parts of a Property.—Valuators who are particularly conversant with office building management and office renting are sometimes called upon to estimate the amount of rent procurable, unit by unit, throughout a building. A similar problem which requires appraisal training is the estimation of the rental items entering into the accounting systems of firms; for example, a large department store in which each department shares in the rental overhead. There are other similar cases requiring a rent distribution consulting service.

Appraisement to Determine Rental under Long-Term Leases.—Many long-term leases provide for reappraisement periodically to determine the amount of rent during the succeeding periods. Usually the lessor and lessee each select an appraiser. These two, if unable to agree upon a value estimate, may select a third, acceptable to both, to make the valuation. The rent is then a percentage (of the appraised value) as specified in the lease.

To Determine the Assets of an Estate for Inheritance Tax Purposes or Distribution of Assets under Wills, etc.—At the time of the closing of an estate the value of the real estate is required by the courts, and appraisals are made. Where the inventory of properties is composed of many items, it may require a number of months to complete the work and all of the properties should be assigned values as of the same date. The total value of the estate on the date selected can then be found, but it is usually desirable to indicate any anticipated change in this total value. To do so the directions of the values of each property must be considered and those which are likely to appreciate, those which are likely not to change, and those which will probably decrease in value are segregated. It would be dangerous practice to attempt to give an actual figure representing a future total value of such an estate, but it is proper to indicate that the estate as a whole will probably become less or more valuable.

Such appraisals are made for inheritance tax purposes, the excess profits tax and other returns to the Internal Revenue Department, and are usually requested by trustees, administrators, and the executors of estates, including the trust departments of banks, and attorneys.

To Determine Value for Income Tax Purposes.—In the adjustment of the amount of income tax which it is fair for the government to take, and for the purpose of supporting claims for paid-in surplus, real estate may require appraisal. Many such appraisals are now made retrospective to show the valuation as of March 1, 1913, the date upon which the Income Tax Law became effective. In such retrospective valuations only certain sorts of data are permitted under the decisions of the Treasury Department, and all other evidences of value, such as subsequent sales of real estate, are not acceptable. In fact, retrospective appraisals submitted in support of claims for a paid-in surplus are not accepted in any cases where other reasonably satisfactory evidence is available.

Determination of Rates for Public Utilities.—The Interstate Commerce Commission and various State Public Utility Commissions require valuations of the properties of public utilities for the purpose of rate determination. Such instances require the replacement cost of the utilities as the foundation of value and the purpose of the evaluation precludes any use of income as the method of approach. Not infrequently the commissions lay down specific regulations covering the method of appraisal. Usually real estate assets are appraised as in any other case except that the value to the corporation rather than sale value is determined upon, and the actual investment outlay may have a bearing upon the valuation. This is appraisal from the accountant's point of view—

very different from the general case of real estate appraising.

For Taxation Purposes.—Real estate is taxable in proportion to its fair cash market value. The tax assessor has as one of his greatest problems the maintenance of uniformity between the values which he ascribes to similar properties. Justice and equity in the taxation of real estate make the function of the tax assessor difficult and important. The necessity for uniformity introduces many valuation problems in tax assessing which do not enter into the appraisal of individual properties. Usually the rather elaborate processes of evaluation used in the appraisal of individual properties cannot be used by tax assessors. They require comparatively simple and direct methods which will be uniform for most properties. In urban properties the prevailing custom is to assess land and building separately and, while such a practice is not correct in most cases of urban evaluation, it is probable that it is preferable when appraising for taxation purposes. Land values will then be appraised with some uniformity, and the taxation of buildings will be related to their costs without much adjustment for inadequacy or unsuitability to the land. Any excess taxes paid upon buildings thus appraised become one of the penalties of obsolescence and unsuitability. It will be equally true, however, that assessed valuations are not criteria of fair cash market value.

For Condemnation Purposes. — The condemnation laws provide that ground and buildings taken by the municipality or government under the powers of eminent domain for public use from a private owner shall be paid for in an amount representing their fair value. The determination of values is a function for the real estate appraiser. There is a variation in the condemnation laws of various states and the valuation of condemned properties must of necessity correspond to the provisions in the law and to the ordinance authorizing the taking of property for public purposes. Usually a determination of the damage suffered because of the part taken and the benefit to the remainder, if any, derived from the improvement is required. Thus the valuator estimates the original value of the property as a whole without reference to the public improvement, and the total value of the property remaining with due regard for the value produced by the improvement. The timing of the improvement will be important. In some cases damage and benefit are not operative against buildings, inasmuch as the ordinances provide that the land will not be taken, nor the improvement made, until after the natural death of the existing structures has taken place. While such an arrangement is not common, every case of condemnation exhibits quite a hiatus in time between the passing of the ordinance and the completion of the improvement.

In condemnation cases the seller is an unwilling one and it is quite reasonable that he should not only be insured against all possible loss but that he should also obtain some compensation for any inconvenience to which he may be put, and for any prospective rise in value from a source other than the improvement.

To Determine Benefits and Awards in Connection with Public Improvements.—Property which is increased in value by virtue of its location on or near a local public improvement is assessable in most cities for the construction of the improvement. The extent to which it is assessable is determined by the amount to which the property is benefited. This is an appraisal problem and the spreading of special assessments is one of the most complex of all valuation processes. Where a public improvement damages private property the municipality is responsible for compensation in the form of an award to the property owner so damaged and the extent of the award depends upon the damage sustained—an appraisal problem.

In connection with public improvements valuators are frequently asked to appear as witnesses in court, and it is important that a very obvious distinction be drawn between the real estate appraiser and the expert witness. The appraiser supposedly is entirely unprejudiced and in his valuations is both witness and jury. He weighs all of the evidence and considers all sides of a problem. There is no contention and his value estimate is unbiased and uninfluenced. The expert witness, on the other hand, answers the questions of the attorneys. He tells the truth, gives his honest opinion, and is supposedly unbiased, but he is required to follow the questions put to him, which may, because of their rotation and inference, lead to other than an uninfluenced opinion. He does testify for a contending party. This is a different function from that of the real estate appraiser and the two related functions should be carefully distinguished, and not in any way confused.

To Determine Impairment of Value for Damage Suits.—New bridge abutments, changed grades, water tunnels, and similar construction work may damage property. The city, the government, railroads, and private parties may be liable for such damage and a determination of the extent of the damage provides an occasion for appraising.

To Estimate the Cost of Improvement.—It is primarily a function of an architect or engineer to estimate the structural cost of a new or contemplated building, or other improvement, but not infrequently the real estate valuator may be asked for such an estimate.

To Estimate the Replacement Cost of an Improvement.—The estimating of the structural or sound value of an old improvement is again primarily the function of architect or engineer. Nevertheless, some training in making such estimates is required in an appraiser.

To Determine the Best Utilization of a Property.—In a sense, the determination of the best utilization of a property enters into most appraisals. The valuator becomes purely a consultant and renders an opinion as to the correct use of a property. He may be consulted with respect to the character of improvement best suited to vacant sites, the remodeling of older improvements to meet changing conditions of district, the height to which it is most profitable to build improvements, the selection of the most expeditious time in which to do any of the above, and similar problems having to do with the use of property. In this connection he will not infrequently analyze the value of a site under several assumptions as to its future utility and indicate by his analysis which of the uses will be the most productive over a reasonably long period of time.

These are the purposes for which appraisal service is required. The list may not contain all of the occasions for evaluating real estate but it does represent most of the practical business operations and government operations which involve real estate appraising.

The Business of Appraising

The appraising of real estate is a business to-day. There is, however, a decided tendency for real estate evaluation to become distinctly professional, and it is probable that in a short time real estate appraising will be recognized as a profession as truly as any other.

The characteristics of a profession are rather definite. There must be a body of clients requiring a service of some kind. There must be a technical training necessary to render such service. The training must take the form of instruction in the application of a general science, and it must be recognized generally that such a service can properly be rendered only by those who have enjoyed such training.

With the further development year by year of methods of analysis and with the discovery and study of the controlling principles of land economics, the appraisal of real estate will tend directly to become professional and the "off-hand" opinions rendered in reports to-day will give place to the technical methods and processes created. At present, however, valuations are made by real estate men as a specialty in their business and such service is considered as a side line. These men are practical business men and their methods are for the most part empirical. The gradual merging of the practical business man's knowledge and observation of real estate with the scientific method of thought and analysis cannot but presuppose the creation of a new profession to serve more fully the real estate valuation functions in the business world.

In a sense, every real estate man must be something of an appraiser. The ability to ascertain the real value of properties is to him a phase of his salesmanship. It is not probable that the average real estate salesman needs to know the highly technical methods of value computation, although such a knowledge will of necessity be advantageous to him, particularly if he operates in properties of great values. Specialization is a productive device in the social structure. The division of labor introduces greater efficiency and greater skill, and specialization is becoming more and more the rule in the real estate business. In general, such specialization takes place in terms of the class of real estate which the broker handles. The segregation of appraising as a specialized field would be a somewhat new departure. In general, successful specialization does not separate itself from the general field, and the appraisal profession, when it exists as such, probably will not exist independently. It is likely that the real estate broker will and should be the logical valuator.

In most communities where there are organized real estate boards, these associations have created valuation committees, each consisting of three or more members selected because of their qualifications as appraisers. These committees sell their services to the public to make valuations. In some communities the vast majority of the appraising is done by such committees, with the exception of tax assessing, and in such localities the appraisal reports rendered carry with them an official character with the public.

In the larger cities there are, of course, a number of real estate brokers who make a specialty of appraising, but rarely are there public real estate appraisers who confine themselves exclusively to appraising.

With the transition of the appraisal of real estate from a business to a profession the methods of conducting the service as well as the methods of appraising will undergo change. While there is no typical form of appraisal report rendered to-day by appraisers, such reports usually follow very closely the same general lines. They are sometimes simply letters to the client. In other cases some valuators use leather covers, seals, ribbons, and other devices to give an air of importance to their documents. In most cases the contents of the report consist of a legal description of the property, a brief general description of the premises, a statement indicating the appraiser's opinion of the value of the property, and a certificate, signature and notary's seal. In addition, some appraisers make a practice of listing their qualifications as valuators. Obviously, such reports contain only two items of very important information for the client: the value opinion, and the appraiser's signature. In the future a more lengthy report will undoubtedly become the rule. The client will receive a thorough analysis of the factors which give his property value. These factors will be discussed along with the problem of the highest and best utilization of the site. The actual computation of the value estimate will be fully given and the processes used will be explained. Maps, plats, diagrams, historigrams and other graphical devices will be included. Obviously, such a report as this will not always be required in every case but the valuator should conceive of his service as a consultant, ready and willing to fully study and report every factor affecting his valuation. Some valuators have made this their practice for years, but nevertheless the typical valuation reports to-day, whether rendered by individual appraisers or by board committees, are usually too brief to serve to the fullest extent.

Most of the treatises on real estate appraising which have appeared in periodicals have concerned themselves with the important matter of the qualifications of the man who is to make the appraisal. While the methods involved in the appraisal processes are the primary subject matter of this book, still those personal qualifications and individual characteristics which the valuator should possess are of importance. These qualities are, of course, the personal characteristics which best adapt the functions and processes of appraising method to concrete valuation problems in the business world.

Research Capacity.—Valuations should be predicated upon adequate evidences of value. The valuator must be a man who knows how to investigate and secure data. He must be capable of knowing what elements constitute evidences of value in real estate. In the past so many appraisers have been content to believe that a thorough knowledge of real estate in a brokerage way was sufficient that there is little appreciation given to the importance of a genuine training in the technique of investigation and research. In practice this failing usually takes the form of inadequate data upon which to make a proper valuation. The many sources of information and the proper devices for the collection of such data should not be overlooked, and the properly equipped appraiser will be a man who knows the sources and the methods best used to secure data in usable form.

Analytical Ability.—The proper use of the data collected involves a very thorough knowledge of those processes of deduction by which valuations are properly made. The appraiser must be a student and analyst capable of relating evidences of value and weighing them by consistently organized logical reasoning. Too much stress cannot be placed upon the ability to select proper processes of thought. Haphazard, unorganized habits of thought do not lead to correct appraisals. The capacity to take a group of data, classify them properly, interrelate the factors, and deduce a result by following a deliberately laid out process of logical thought is requisite in the real estate appraiser. This capacity requires training in the ways of thinking, and such training should not be omitted in the effort to become a skilled valuator.

Brokerage Experience.—The value of real estate is a market phenomenon and contact with the real estate market is necessarily a prerequisite to proper qualification as an appraiser. All appraising methods ultimately consist of the finding of a true value of a property to a typical real estate user and the correction of the true value for market influences. Speculation in real estate is a major element of value and the importance of market influences is paramount in appraisal method. Immediate and personal contact with the purchase and sale of real estate, and usually the character of real estate under appraisement, is essential.

Discretion and Judgment.—The making of an appraisal is not an intuitive process. Valuations cannot be made by exact methods and a number of axiomatic assumptions are required of the valuator. His judgment in the selection of assumptions must be tempered with a true appreciation both of his own function and the valuation problem. Discretion and judgment are obviously characteristics which are necessary in an appraiser, quite as much as honesty and integrity. He must be a man who will make every effort to rule out prejudice and who will not be influenced or biased or bought in the conduct of his appraisal business.

Reputation.—The uses to which appraisal reports are put require that the signature of the valuator carry with it considerable weight and importance. Thus it is found that there are very few recognized authorities in the field of real estate appraising who have not long records of experience in the real estate business. And it is equally true that the recognition which these appraisers have secured is coupled not only with length of training in the general field but with quality of service, integrity, and a simple direct honesty in the conduct of their appraisal business. The sustained confidence of a clientele is the direct resultant of the practices which create such reputation.

The Methods of Appraising

Appraising is the act of setting a price upon a thing. Price and value both presuppose a sale. Thus in the appraisal of real estate the valuator is concerned with the estimating of the sale price of a real property. He is not concerned with other concepts of value except in so far as they may constitute an index of market value.

There are many extraordinary factors which can enter into the bargaining which determines the actual price in a transfer of property, resulting in a higher or lower price than would be normal, and the general appraiser cannot predict such factors. Therefore it is customary for valuators to define the value estimate which they place on property as "fair cash market value," meaning thereby that the valuation represents their estimate of the price at which a property would sell under normal and typical conditions. The court definitions of the value of a piece of real estate attempt to explain what is meant by normal and typical conditions of sale. These definitions are all similar in concept. One states that "the fair cash market value of a piece of real estate is the price which a seller who is willing and able but not compelled to sell will accept for his property from a purchaser who is willing and able but not compelled to buy." Perhaps not many actual transfers of real estate take place under exactly such conditions. Nevertheless, the definition provides a norm of conditions which is capable of utilization in making valuations.

It is certain that with such a definition to follow there can be but one fair cash market value of a property at any given time. It is a common subject of discussion among appraisers whether or not the purpose for which the valuation is made should not affect the value estimate. Some would feel that the appraiser is in a very different position if he is advising as to what amount might be loaned with safety upon a property, from the position which he occupies when he is consulted as to the amount an owner might expect to realize when he sells in the general market. It is pointed out that in the first case foreclosure of the mortgage may occur involving a sale at a very inopportune time, while in the second case the owner may wait until he receives a good offer from someone who can use the property to its full extent. And so with all such discussions there is a departure from the definition and the introduction of other than normal sale conditions.

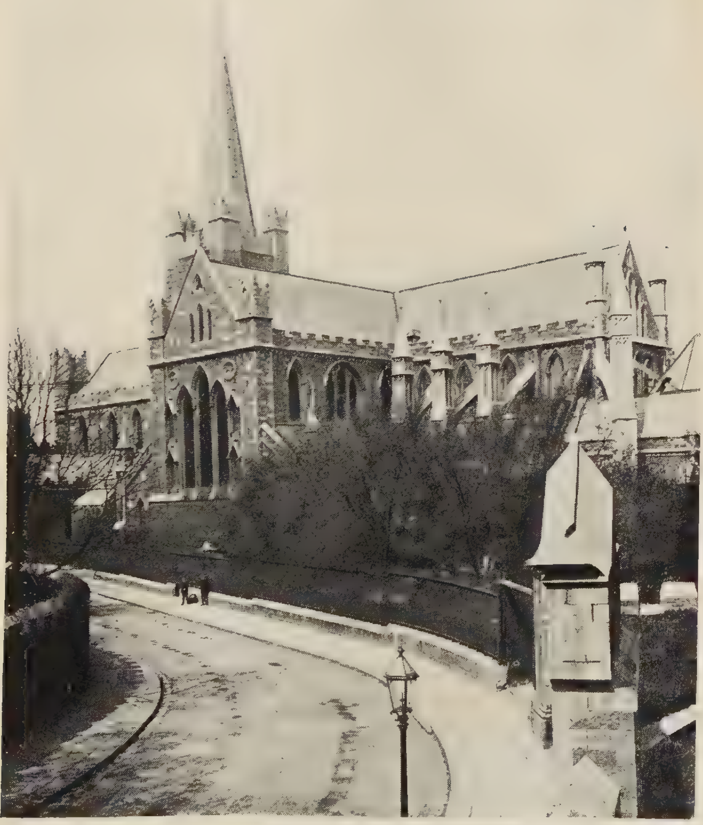
The fact that so many individuals do feel that it is possible for a property to have several valuations depending upon the purpose of the appraisal simply indicates the vital necessity for a definition. It should be a first principle with all valuators never to express any value without accompanying it with an unmistakable definition or explanation to show exactly what is meant. A property may have only one fair cash market value, but it would very well also have a quick cash sale value, a value to a specific owner or prospective purchaser, stable value, etc., and each and every one of these concepts of value might occur in a single appraisal report in substantiating the fair cash market value. The importance of stating exactly what is meant is obvious. The word value alone in real estate parlance is practically always used to refer to fair cash market value.

It should also be pointed out that there are many properties, particularly those of very high value, which do not have an open and general market. There are few effective purchasers for high value real estate, and it is usually true that no competition among purchasers, in the ordinary sense, takes place when such properties are sold. In these cases the appraisal method assumes that the utility of the site and building viewed from its income and investment characteristics is exactly comparable to its fair cash market value if it had a general market. A particular downtown site may be producing a splendid income but no cash purchasers present themselves. To conclude that the property has a fair cash market value only equal to the low price necessary to bring out bargain-hunting buyers would be incorrect, and the valuation placed on the property is based upon the income. Furthermore, the value estimate arrived at in this manner is assumed to be a fair cash market value.

It is equally important that the date of the ascribed value be clearly given. There are retrospective appraisals and predicting appraisals and confusion may be difficult to avoid. It has happened that an appraiser has given his opinion of the value of a site assuming the site to have been improved and the new building a "going concern," purely a case of prediction, only to find his valuation being used as testimonial of present ground value. Thus every valuation estimate should not only be carefully defined but definitely dated.

The methods used in securing data and the processes which are expedient and feasible in evaluation are described in the succeeding chapters. In general, the method involves the calculation of a stable value by a definite process suited to the problem, the corroboration of this value by the application of other possible processes and the use of other processes to bring out certain latent facts concerning the real estate, and finally the adjustment of the stable value to reflect the effect of market forces. For illustration, an apartment building and its site might be appraised by capitalizing its net income. This would give the stable value of the property. This value would then be corroborated by a "check" process such as the adding of the going value of vacant land in the district to the structural value of the building. The latter process not only checks the original value but indicates, by its difference from the original value, the degree to which the property is under- or over-improved.

To complete the valuation, the appraiser might wish to add or detract an amount from the stable value based upon the demand and supply of similar properties in the immediate real estate market. His report would show, in all probability, all of the check processes which he applied, and would be very explicit in indicating the principal process from which he secured his estimate of stable value. This illustration is given to show that there is one principal process of approaching the value of the property. We will discover that the process may be different for different kinds of property, but that in each case there is one best process upon which to rely. The illustration also serves to show that reliance is not placed entirely upon the one process, but that several other processes are introduced as checks. It also serves to indicate that check processes themselves produce additional information concerning the property, and, finally, it shows that the final step in all appraising is the careful adjustment of stable value to correspond to the market in which the property would be sold. Most of the illustrations of appraisal procedure in the following pages will deal with the application of one process in each



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APPRAISED BY THE SUMMATION PROCESS

case, but the reader will understand that the complete appraisal procedure involves all of the steps presented above.

There is still another generality applying to the methods outlined, namely, that the principal process used in approaching the values of properties will in each case be that process which most closely approximates the motives and factors considered by purchasers. That is, the appraisal processes outlined do not have inherent merits which warrant their use in different cases, but rather the appraiser bases his selection of a principal process upon the motives of the majority of the potential buyers in the immediate market for the particular property. This does not mean that the valuation method is made to correspond to the purpose of the appraisal, but that the process chosen will be one which involves, in the analysis, the same reasoning as that which buyers in general would probably go through in deciding whether to buy or not. In other words, that appraisal process is selected as the correct one in each case which most closely corresponds to the market in which the property would be sold. Hence we might have two properties with exactly the same characteristics and practically identical except for location, and still be warranted in using one process in the evaluation of one and another process in the evaluation of the other if the markets in which they would be sold were not identical.

There are a number of appraisal processes. Each one cannot be advanced as preferable in the evaluation of a particular type or class of property. Rather, each is applicable to particular classes of properties when salable in a particular type of immediate market.

For example, in the appraisal of detached individual family dwellings, if the purchasers of homes in the district were for the most part investors who did not themselves live in the houses but instead rented them to secure an income, the correct appraisal procedure would utilize the amount of income which the houses produced and they would be appraised purely as investments. If, on the other hand, the purchasers of houses were for the most part individuals who bought for the purpose of living in the houses themselves, the correct appraisal procedure would be to measure the importance of such homes to such buyers as indicated by the prices at which homes of similar kind were selling. The latter process is recommended below because most house buyers to-day are purchasing homes in which to live, but the other process would be correct were the market within which the house would be sold composed mostly of investors. This generality is more than justified, and proper selection of processes will depend on the character of the market quite as much as upon the character of the actual property.

Where the process of appraising by an analysis of the income is possible it is usually the preferred approach to value. In practically all other cases comparison with other properties and the cost of creating the utility on the site will be the point of departure in the evaluation method. Where property is improved, the total value of the property is found first, and the distribution of this amount, first to the improvement and then to the land, follows. If this process indicates a lower land value than the known value of the land in the district, there is inadequate improvement, and other processes are introduced to complete the actual correct distribution of value between land and building. Nevertheless, the total value of the property in these cases is still that indicated by the process used to find total value of the property as an entity. Unimproved land is usually properly appraised with some reference to its income-producing capacity if capable of cultivation or if under cultivation. Mining and timber land is appraised similarly in principle but with the allowance necessary for the destruction of resources which occurs with its use. Urban vacant land is appraised with reference to its potential use and the methods used are not different in principle from those used in the valuation of improved urban property.

Each of the evaluation processes aims primarily toward the placing of value estimates on individual properties. These were to be, ordinarily, fair cash market values, except where specifically stated otherwise. Value in the sense in which we use it is a market phenomenon and the obvious corollary will be that a value estimate will be a market estimate, an estimate which may or may not be expressed in terms of a single value. Practically all valuations give a single estimate of the value of the property but it is fairly obvious that in reality the appraiser tries to place his figure in a zone of value which he believes fair. There is then inferred in every valuation a zone of value with minimum and maximum levels within which the value of the property lies, and appraisal methods are utilized to determine and to narrow this zone—the zone of possible error—as much as possible. Where real estate uses are well established, as in the central business districts of cities, the zone of value will be quite restricted. In real estate on the borders of cities where rapid changes are taking place, the zone will be large and less accuracy possible or necessary in appraising.

For example, we would observe that actual normal prices per front foot in the central retail district might tend to range between $19,000 and $21,000; in apartment districts from $450 to $550; and in new residential districts from $50 to $70.

The zones would then be:

District	*Average Unit Value*	*Zone*	*Dispersion*
Retail District	$20,000	$2,000	10%
Apartment District	500	100	20%
Residential District	60	20	33%

Thus the technical appraisal processes tend toward very fine measurements in high value districts, while in lower valued real estate the necessity for accuracy is appreciably less and would not always mean very much.[1] Would it not be a wise practice for realtors making valuations to give their zone limits and to explain the extent of dispersion they accept? It would be a convenient and correct way of telling the client the degree to which the productive utility of the site as opposed to speculative elements has entered into the valuation. It would simply be a common statistical device applied to the problem of defining what our valuations actually comprise.

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[1] The dispersion in value estimates seems to decrease with the extent of the experience of the appraisers, even though the same processes of evaluation are utilized.

In a Y. M. C. A. class seven appraisal reports on a downtown property were submitted by students with the following results:

Land Values: $1,023,960 to $1,468,450—Average $1,238,037. Dispersion 36%

Building Values: $805,920 to $1,304,194—Average $1,017,532. Dispersion 49%

Total Values: $2,005,920 to $2,772,644—Average $2,255,569. Dispersion 34%

On the other hand, three public appraisers working independently, recently appraised the land under one of the larger buildings in Chicago as follows: $250 per sq. ft. $243 per sq. ft., $238 per sq. ft.—average $241 per sq. ft.—dispersion 5%.

The significance of this comparison is that great dispersion disappears among experienced valuators, provided they proceed in accordance with correct processes. Without approved appraisal procedure, great dispersion remains in spite of experience, and property evaluation is relegated to the field of opinion.

In addition to the processes for the evaluation of individual properties there have been developed methods for the appraisal of lease equities. These methods are the result of the application of actuarial procedure to the general appraisal processes (See Chapter XI).

Furthermore, there have been developed a number of statistical devices which aid valuators in comparing the values of various pieces of real estate. These systems make provision for comparable units and indicate the typical effects of the geometry of lots upon their values (See Chapter XII).

It has been the object in this chapter to state the problem, that is, to describe the nature of real estate appraising as a business and to indicate the occasions for the making of valuations. It has been shown that appraisal method—the subject matter of this book—is the result of an attempt to apply the general principles of land economics to concrete business problems such as those listed above in this chapter. Thus in the development of the subject we turn next to a consideration of the economic foundation of real estate values.

CHAPTER II

ECONOMIC FOUNDATION OF REAL ESTATE VALUES

The value of real estate is a specific case of value in general. It rises and falls in accordance with many of the same principles as the values of ordinary commodities. Nevertheless, between land values and the values of ordinary commodities there are some particular differences which enter into the development of real estate evaluation methods. Hence the economic background of real estate values should deserve attention.

Value may be defined as the ratio in which goods exchange. The value of a commodity is its power to command other goods in exchange and the value of land is its importance measured in terms of an exchange of land for money or some other commodity. Thus conceived, the value of land is a very different thing from its usefulness, or utility. In the first case we have an exchange value and in the latter value in the sense of importance in use or production. Value as we will use the word will signify value in exchange.

The presence of value in this sense is a market phenomenon. While no two pieces of real estate have exactly the same location, there are many pieces which are exactly comparable or nearly so which compete with each other in the market. Numerous offerings of similar pieces tend to impair the value of each one, and scarcity of offerings tends to increase value. Supply and demand are market forces which assist in determining real estate values.

Land serves us in a twofold capacity. It is in some instances a "consumption good"; that is, we use it directly for recreation or a home. In most cases it is a "production good," or capital used in the production of consumption goods or services. The farmer's land is valuable because it produces crops, the city business site because it furnishes services. However, the home when rented for money is valued as a production good just as is the farm or the business site.

Through its products or services land furnishes an income to its owner and this income is termed *economic rent.* The rent of any piece of land is measured by the difference between the money value of the products or services obtained and the cost of the labor and capital necessary to its utilization. It is assumed that such labor and capital was applied in the most economical proportions possible in order to obtain this income.

To illustrate this principle let us take a simple case from agricultural land. An application of a unit of $5.00 of labor and capital in the form of labor, fertilizer, machinery, and power (including interest and risk costs), will produce ten bushels of wheat per acre. With wheat at 50 cents a bushel the total income will merely cover the labor-capital costs of $5.00 and there will be no rent. If the price rises to 60 cents, the total income becomes $6.00 and a rent of $1.00 an acre appears. This illustration shows that rent is the result of price and does not determine price; neither do any of the other elements of the expenses of growing wheat determine its price.

Should the price of wheat go to one dollar the economic rent would rise to $5.00. But why should the farmer be satisfied with making only one unit of expenditure per acre? Suppose he applies a second unit; he will find that, because of the law of diminishing returns, he gets 8 bushels additional and not 10. Nevertheless, this means an eight dollar return for his five dollar expenditure, leaving a rent of $5.00. A third unit of labor-capital expenditure might bring 5 bushels, a yield just large enough to cover costs. He has now reached the margin of profitable expenditure, or the *intensive margin*. Let us summarize the results:

Units of Expenditure	*Total Income*	*Rent*
1	$10.00	$5.00
2	8.00	3.00
3	5.00	0.00
Total expenditure $15	$23.00	$8.00

However, one of the characteristics of land is that it exists in various grades. Farms differ widely in fertility throughout a state or even within a neighborhood. Suppose there is a "B" grade of land yielding only 8 bushels instead of 10 as on the best land for the first unit of labor-capital expenditure. With 50 cent wheat this land would not even pay for labor-capital costs; in other words, it would be considered *sub-marginal* for wheat. But at $1.00 wheat it would be super-marginal and yield a rent of $3.00; a second unit bringing 6 bushels would still yield a rent of $1.00; while a third unit might bring but 4 bushels and would be unprofitable. "C grade" land, yielding but 5 bushels where the other lands brought 10 and 8 bushels respectively for the initial expenditure, would be on the *extensive margin*.

It will be noted that at no time are the margins fixed. As wheat rose from 50 cents to $1.00, there was a movement of the extensive margin to poorer and poorer grades of land. At the same time the intensive margin rose higher and higher on each grade of land in utilization. Should the price of wheat continue to rise and the other factors remain the same we can expect more of the inferior soil brought into use and a more intensive utilization of the better kinds of wheat land.

Summing up for the three grades of land we have:

Expenditures	*A*	*B*	*C*
1st	$5 rent	$3	0
2nd	3	1	..
3rd	0	..	..
	—	—	—
Total rent	$8	4	0

Our crude illustrations have made plain some of the principles underlying land income, whether agricultural or urban land be considered. The law of diminishing returns operates in the height of skyscrapers just as it does in farming. There is an intensive and extensive margin for each type of land utilization. At the extensive margin the more intensive use begins to merge into a less intensive use.

Economic rent measures the economic advantage which one piece of land enjoys over another. This advantage may consist of nearness to market. The nearer to the market the farm lies the higher the price for the product. In the above illustration, were the farmer on "A" land to receive $1.25 for his wheat, B $1.10, and C only the $1, the rents would be $9.70 for A, $4.40 for B, while C would be the same. On the other hand, conditions might be reversed, and the advantage of fertility be counteracted by that of location. The influence of transportation and lower freight rates is therefore an important element in land income.

But other factors may also influence land income. With no change in the other factors, if labor-capital costs are reduced rents must rise. Farm machinery has had this effect. On the other hand, anything that raises the price of the products or services of land will have the same effect. The tariff, a better marketing system, the high war prices for tobacco are examples.

The rent of urban land must be traced through the intangible *services* of land instead of physical products, such as wheat, cotton, or oranges in agriculture. The country cross-roads site invites the locating of a general merchandise store on this spot because it is easily accessible to the surrounding countryside. With the growth of a village around it the land income on that site becomes greater, the land values higher, not because the merchant is charging more for his goods, but because he has more customers, he is selling *more* goods; in other words, the land is yielding more services. When a great city has superseded the village, the rents on that corner and the value of that land may be so high as to be astounding to one not familiar with urban land economics. The goods now sold in this store may not have risen in price; in fact, probably sell for less than in the store at the country cross-roads. We note again that rent is not the cause of prices. Rent is the resultant of the capacity of the site in the sale of greater quantities at the same prices.

Economic rent, then, is the basis for differences in real estate values. It arises from differences of advantage in land fertility and location with reference to population.

In the economic structure in which we live, every phase of life is affected by natural resources and a vested right in landed property. The relationship of man to land is complex and of far-reaching importance. The real estate of our cities carries more than three-fourths of the costs of municipal government. An unwise taxation policy can hamper the growth of population and the development of cities through the burden placed upon the free and logical utilization of real property. Credit, which is as important as money in the conduct of commerce and industry, has its very foundation in the land. The facilities for borrowing upon the security of land determines in large measure the progress of civilization itself. Then again, the value of real estate at any given moment is difficult to determine. Perhaps the outstanding reason for this has been the extremely rapid growth of our population, involving as it has the speedy reduction in natural resources, the unwise and irrational use of land, and the rapid migrations and expansions of population in every way. Had our population increases been more gradual and had movements of population been less erratic, land utilization would have followed more closely normal trends. As it is, there have been violent value fluctuations in land values and in the prices which persons have paid for properties and many have come to believe that land values are not founded upon any principles more stable than the whim of human speculation.

The effect of speculation upon the value of land is far-reaching. Individuals are lured by the rapid rise in property values to speculate in real estate. Investment in land is frequently made not with the purpose of using the land so much as with the purpose of reselling it at a profit. Little attention has been given to the costliness of holding land in this manner. The waste in capital and energy which accumulates on account of speculation and unwise land utilization in the United States is enormous and reduces the long time value of land considerably.

With this correction in our concept as to the source of real estate values it is possible to show that values are the resultant of the various uses to which land can be put in production or distribution and that such utilization or potential utilization is the underlying factor which determines the market price. This is true of the normal long time value of real estate properties, but variations from such normal values result from time to time from market phenomena. Some of these market phenomena which cause value fluctuations from normal long time value trends may be cited.

Among the causes are the changes in general commodity prices which cause differences from time to time in the amounts of rent which business firms can pay for the use of land and buildings. The rents form the tangible source of value and are reflected in sale prices.

A special case of commodity price change which affects the value of buildings is the change in the prices of building materials and the change in the wage level of construction mechanics. If building costs rise in a rapidly growing city, the rate of building will be somewhat checked, rents will rise, and values will soon increase to the new cost of producing buildings. That is, the cost of reproduction becomes a more important factor in the value of the building than the original cost. If the city were not growing rapidly there would be small demand for new structures for some years and there might be a number of years elapse before the value of buildings would equal their cost of reproduction.

A very commonly overlooked source or cause for fluctuation in the prices of real estate is the periodic change in the volume of money—or, at least, circulating money. All commodities increase in value when the volume of money increases. Real estate does likewise.

It is a common matter of observation that land values follow a certain course during the progress of a business cycle. At the beginning land prices are low. As time goes on, land becomes salable at old value levels. This level persists usually for some time and then a rapid price advance takes place. The number of real estate

TABLE 1

Periodic Trends

	Real Estate Price Index	*Commodity Price Index*	*No. of Real Estate Sales*	*Real Estate Rent Index*	*Bldg. Cost Price Index*	*Bldg. Activity by Permits*
1900	80	81	...	...	75	58
1901	81	79	...	...	77	76
1902	83	84	...	...	78	75
1903	85	86	...	...	81	77
1904	88	86	...	...	79	90
1905	92	86	...	...	83	122
1906	100	89	...	...	91	115
1907	107	94	...	...	95	101
1908	110	90	...	...	92	97
1909	102	97	...	...	93	125
1910	94	101	79	91	96	114
1911	93	93	80	91	97	110
1912	94	99	90	102	98	114
1913	100	100	100	100	100	100
1914	100	98	105	103	96	95
1915	101	101	108	104	97	102
1916	100	127	128	105	113	106
1917	117	177	143	103	136	58
1918	142	194	110	111	150	29
1919	171	206	181	120	176	80
1920	185	226	202	140	232	67
1921	174	147	142	157	178	115
1922	171	149	157	162	174	174
1923	181	...	200	166	193	197

Real Estate Price Index: Induced by sales in an unchanging district in Chicago.

Commodity Price Index: Index numbers of wholesale prices U. S. Bureau of Labor Statistics.

No. of Real Estate Sales: Index numbers derived from survey by National Assn. of Real Estate Bds. for Co. of Cuyahoga, O.

Real Estate Rent Index: Index of house and apartment rents, special commission on necessaries of life, State of Mass.

Bldg. Cost Price Index: Index of building costs, National Industrial Conference Board, New York City.

Bldg. Activity by Permit: Index of the value of building permits in 1913 dollars, Natl. Industrial Conference Bd., N. Y. City.

transfers increases. Speculation commences. Overexpansion becomes the rule in industry—new factories, overproduction, and large credit loans. Other advances follow in quick succession. Cultivation and urban land utilization are carried onto poorer and poorer land, resulting in a boom and then the crash with all of its tremendous losses. At this point the prices of most commodities fall rapidly in order to maintain the excessive demand which has existed, but real estate prices usually "freeze" at their high level and transfers of properties become few. In time the prices of real estate may fall in sympathy with general commodity prices but this has not been the case in most of the rapidly growing American centers. Nevertheless, there is a decided correlation between the indices of general commodity prices and the price of real estate, but the nodes of the real estate index are "tardy," that is, they lag and follow the commodity price index only after the lapse of some time. This is illustrated in Figure 2 below.

The sudden increases in the value of real estate which are commonly called "booms" are merely special cases of the value fluctuation or change attributable to a changed estimate of ground utilization. Booms are characterized by two features: (1) Their suddenness and (2) the fact that numerous transfers occur at prices which are in excess of the value which would be indicated by the potential income to be derived from the new utility. Booms are, then, simply extravagant examples of the operation of the real estate market under conditions of changing utility.

The long-time normal value which real property would have were its potential utilization the prime causal factor of value is thus subject to considerable variation because of market phenomena. It is probable that while market factors do cause great fluctuations from utility value over long periods, there is little evidence of any price fluctuation attributable to seasonal fluctuation which exists in many businesses. In residential properties there may be what appears to be a seasonal price fluctuation which is caused by the expiration of leases upon houses and apartments. It is to be believed, however, that such fluctuations are not genuinely seasonal changes but that they are caused by a delayed balancing of the supply of and the demand for homes, the result of the habit of renting fam-

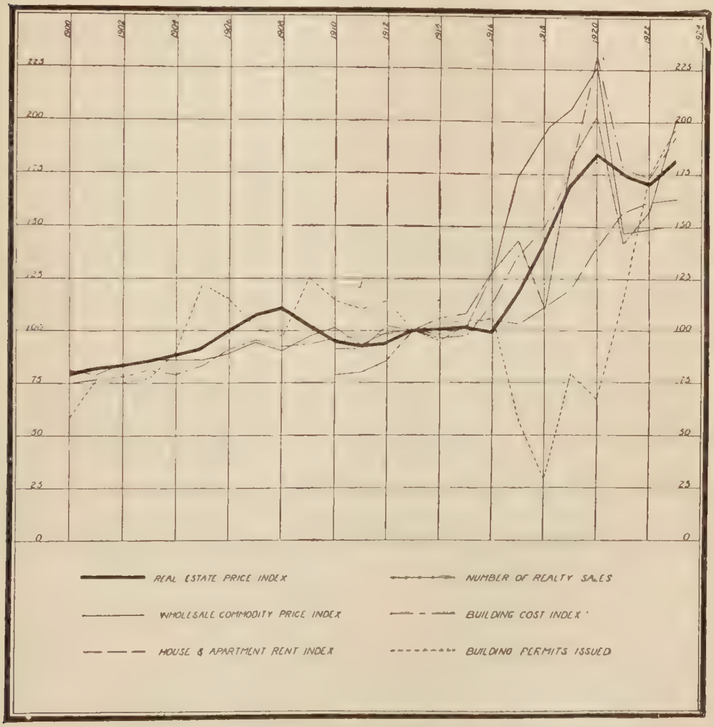


FIGURE 1: HISTORIGRAMS OF PERIODIC TRENDS

ilies to delay moving and relocating arrangements until the time of lease expiration.

Thus from the appraiser's standpoint there are certain principles in land economics which he should apply in his procedure. First he must conceive of rent as a differential created by the commodity price level—not as an item of production costs. Secondly, he must appreciate that the normal utilizational possibilities of a property will be fundamental in his procedure, and, thirdly, he must know that value is a market phenomenon and that the real estate market must be understood and studied in order to correct his value estimates when based solely upon a consideration of the productive use of ground.

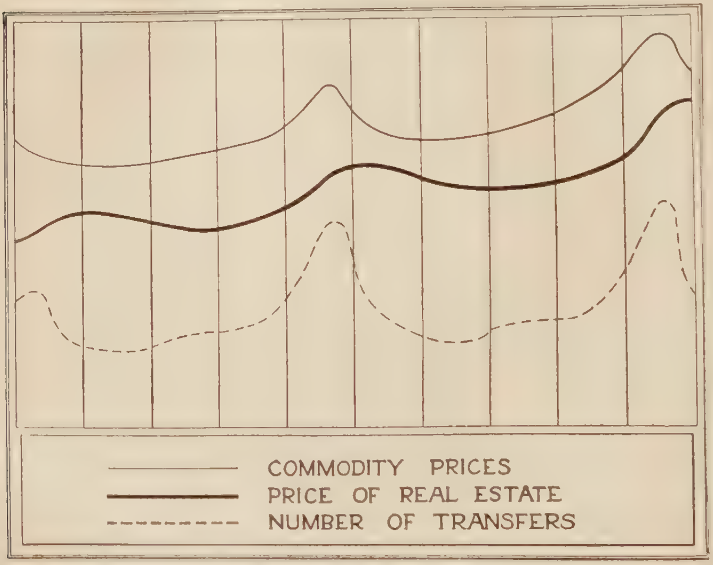


Figure 2: Idealized Historigram

Showing that the number of real estate transfers decreases when commodity prices fall, but that real estate prices do not fall for some time.

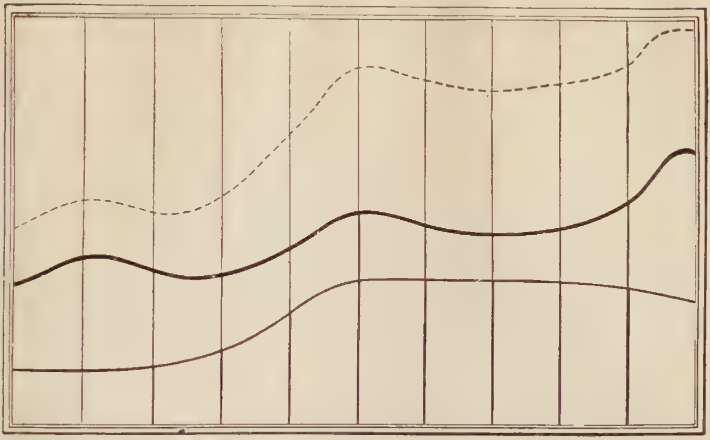


FIGURE 3: IDEALIZED HISTORIGRAM

The broken line represents the price trend of real estate in a specific district. The heavy line is the general trend of real estate prices. The thin line is the difference in level between the other two and indicates the trend in the quality of the district.

He will also do well to conceive of the losses incident to land speculation and to unwise land utilization, and to attempt to appreciate the cost factors which the science of land economics calls to our attention.

So much for the principles governing land value. The specific factors of city growth and development which affect appraisal procedure will invite our attention.

CHAPTER III

THE ELEMENTS OF REAL ESTATE VALUE

Appraisal method ultimately resolves itself into the correct procedure to be followed in utilizing evidences of value in building a value estimate. That the valuator's capacity to know what elements create real estate values and that he make correct assumptions as to the future utilization of parcels of land, are obviously at the root of any procedure. A knowledge of the possible uses of ground and an appreciation of the probable future development of real estate sites is not only advantageous but requisite to the valuator. Hence we consider the factors which create cities, the elements which determine the directions of the growth of cities, the causes of district changes, the reasons for unique value levels in cities, and the individual elements which constitute the evidences and data upon which appraisal procedure must rest.

In the past various causes have operated to fix the locations of cities—not the least of which have been advantages in the form of military or naval defense and convenience for political administration. More important, however, are commercial and industrial causes. Where natural advantages for the production of manufactures or for trading in commodities have existed, there have cities been located. Roughly the sizes of cities tend to be in direct ratio to such advantages. It is notable that locations convenient for trading and the distribution of goods have grown into cities more frequently than have locations which enjoyed a purely manufacturing advantage. Our great cities in America are at trading points and our secondary cities in many cases owe their existence to some manufacturing advantage. In the general case, however, both sets of advantages—those serving conveniently to commerce and those serving industry—have merged to create large cities. There are other factors which have of necessity been influential in determining the locations of cities, such as healthful climate, racial congeniality, and social and intellectual considerations.

That convenience to trading and commerce has been the most important element can be demonstrated by looking at the larger American cities. New York, San Francisco, and New Orleans are seaports and came to be important cities as a result of natural harbor facilities. Chicago is located on the direct line of commerce east and west, the direction of the movement of goods, and at the foot of lake navigation. It is a point at which transshipment was convenient and after the development of the railroad system became a strategic position commercially. Chicago industry developed later after trade had fixed the location of the city. St. Louis owes its existence to the presence of trading facilities for river shipping. Before the complete development of the railroad system St. Louis grew more rapidly than Chicago, but its position was of greater convenience for north and south trade while the direction of commodity movement was east and west. The existence of Detroit is explained on the basis of convenience for lake shipment and location at a point of transshipment. The comparatively rapid growth of Detroit more recently has been explained, however, not on the basis of commercial advantage so much as a resultant of a manufacturing advantage in the form of capital surpluses available at a time when an infant industry was seeking location and at a time when that industry was considered transitory.

It is obvious that sea or land transportation routes made these locations advantageous for commerce. Formerly manufacturing advantages such as timber supplies, coal, water power, etc., were very important factors entering into the regional distribution of industries, but to-day the distribution of commodities rather than ease in their manufacture is and will probably continue to be the greatest factor among those forces which determine the location of cities.

The Regional Distribution of Industries

Industries tend to locate themselves in the most advantageous situations. The regional distribution of the various units of an industry is controlled by the competition of the natural and artificial characteristics of the available locations, and the gradual movements of elements of an industry occur with changes in the relative importance of the existing advantages or the innovation of other requirements.

Adjustment in the location of manufacturing units commences and continues to correspond with changes in the relative importance of local advantages. Manufacturing tends to follow the markets.

The retarding factor in the successive adjustments of industries with changing requirements is the immobility which is the earmark of established industry. Several factors seem to keep industries in their established locations even after superior advantages are apparent elsewhere. One of these factors is the loss entailed by scrapping the investment in the established location.

Another is the skilled labor supply of the old location which is rarely substituted with ease at a new location.

Perhaps one of the most important factors which causes immobility in the face of superior advantages is the fact that purchasers buy habitually in the old market for some time and are willing to pay somewhat higher prices for commodities coming from plants with which they have been accustomed to do business.

In spite of this immobility, progressive business enterprises do attempt to establish themselves in locations which have and which will have superior advantages. Furthermore, new enterprises and new industries which have never been localized can and do place themselves in the most economic positions. The labor supply is important and in some cases the most important factor. An adequate supply of the classes of labor required is essential. Still another element is the availability of local capital, and of banking facilities.

Transportation is the element of greatest importance. Whether the industry will locate close to its market or close to its supply of raw material will depend much upon freight rates. Such industries as pulp or paper making, steel mills, etc., in which the raw material is bulky, and the waste material great, usually find it to advantage to be near the source of material. In this manner it is not necessary to ship huge weights of materials which do not enter into the final product. In other industries—usually the assembling and manufacturing industries—the location of the market controls the plant location, and nearness to market is of the greatest importance.

It just so happens in the United States that most of our industries find it more advantageous to locate with reference to their market and the distribution of their product than to locate in the source of their raw materials. The extractive industries must be at the sources but the great bulk of our manufacturing operations are of the fabricating and assembling character and these locate to the greatest advantage in markets in most cases.

Following such principles, it is only natural that our American cities should have developed as they have. Our larger cities are usually cities of diversified industry and those particular industries which have grouped themselves in a few cities have been either of the extractive nature or owe their grouping to the momentum of a start when decidedly different factors were affecting the regional distribution of our industries. Hence the location of the textile industries in New England is due not to existing advantages so much as to the momentum gained by their original location there. The boot and shoe industry is a similar case. The centering of the automobile industry in Detroit is another case. Its location can be explained as the resultant of an advantageous merging of location in reference to shipping and materials, coupled with the peculiar advantage of available capital during the initial stage of the development of the industry. The meat-packing industry of Chicago is there, on the other hand, solely because of the location of Chicago as a distributing center. The same now applies to Kansas City and to Omaha. The furniture industry of Grand Rapids exists because of the manufacturing advantages of nearness to lumber and water power, although such an industry is necessarily dispersing and its units scattering to many cities—into the furniture market.

In general, it is true that only certain industries group themselves territorially and that usually they do so because of some very specific advantage. In most cases industries are scattered with apparently no reference to manufacturing advantages and with primary preference given to location in the market.

With the development of our railroad system the greater industries came to have a national market. Those manufactures which involved relatively small transportation costs, such as drugs, cheap jewelry, and toys, easily remained grouped and found no necessity for regional adjustment. On the other hand, in those lines where transportation cost was an important factor, rapid dispersion into the marketing locations resulted. Since the War, freight rates have intensified this factor and manufacturers seeking national distribution have created branch factories and assembling plants throughout the country—a fact which in itself shows the greater importance of commercial advantages over purely manufacturing advantages in city location and indicates the decided tendency away from the territorial grouping of similar industries. Thus we observe to-day the rise of a textile manufacturing industry in the South, the rapid growth of shoe manufacturing in the Central West, automobile assembling in every large city, and even machinery and railroad supplies tending to be made in locations where the product will be consumed. Similarly we observe even in certain extractive industries, such as the manufacture of gypsum products, that mining locations are selected with a view of convenience in distribution in an adjacent market and with the location of mixing plants in the city market itself.

Agriculture is in reality one of the extractive industries and the various units of farming enterprise distribute themselves territorially with reference to the climate and capacity of the soil. At the same time, farming districts which are closest to markets develop most rapidly.

A similar parallel principle will be found to apply to the distribution of ground uses within the limits of an urban community when city district phenomena are discussed below.

Directions of City Growth

Most cities tend to develop radially. There is usually a center point, the "downtown district" which was the point of origin of the city. As we have seen, the primary force which determines the locations of cities is trading convenience. Thus the center points or points of origin of cities usually are determined by the transportation or travel routes. In general, the intersection of two major lines of travel will create the center point of the city, and the less important route from the viewpoint of transportation will be the principal street in the city. For example, if two travel routes which intersect to create a town center are a railroad and a wagon road, the wagon road will usually be the main street of the town. Again, if the intersection of two railroads tends to be the center point of city development, the main street of the town will usually be close to and parallel to the less important railroad route. That is, the street which "runs down to" the principal railroad station is usually the most important street and develops much higher uses and values than streets parallel to the railroad.

In the growth of cities the original transportation routes do not as a rule move. The railroads, principal highways, and certainly the river routes are fixed for all time. The intersections of such routes of population and traffic movement tend to develop into the intense city land uses. Other urban land utilities then establish themselves along the routes of travel—that is, city growth usually takes place radially—and the typical city layout is star-shaped.

The various utilities distribute themselves; the retail merchandising, banking, and business district at or near the point of origin, the industries directly on the heavier routes of travel such as the railroads and rivers, the wholesaling and warehousing enterprises between the industries and the business districts, and, lastly, the homes, churches, clubs, etc., at slightly more distant points with ease of access to the business center but away from the industries and heavier transportation routes.

The routes of travel are thus the basic force in determining upon the distribution of urban land utilities. Long distance and heavy routes of travel, such as the railroads, rivers and main highways, will determine the locations of the center point of origin and the industries, coal and lumber yards, warehouses, etc. The lighter local transportation routes, such as street car lines, boulevards, elevated lines, determine the directions which residential development take.

Local Transportation

Little elaboration of the importance of local transportation facilities as a factor in city growth seems necessary. The controlling influence of the locations and character of local transportation routes is obvious. Suburban railroads, interurban electric lines, elevated railways, subways, street car lines, bus lines, and ferries control the movements of people within a city. The routes, speed, comfort, safety, points of transfer, rates of fare, locations of stations, all contribute toward the distribution of people in their city life and in the distribution of urban ground uses. Where the transportation scheme introduces pedestrian congestion the sites will have relatively high values. The relieving of such congestion, as an isolated factor, reduces the values of sites.

The automobile has become a major transportation factor in cities and the growth of cities and use of sites have commenced to show the influence of automobiles. Pavements, breadth of streets, parking rules, and even regulations governing the operation of taxicabs are now true elements which assist in determining land utilization. They affect not only the rapid and convenient movement of people throughout a city but even the routes taken by pedestrians. In many large cities the two sides of boulevards are very effectively divided and the interchange of trade from one side to the other has been very genuinely destroyed. Garage and gasoline filling station utilities have become competitors for locations. Perhaps some day the location of aeroplane landing fields will affect the distribution of urban land uses.

City District Development

Real estate values tend to correspond to the uses to which the sites are put. In a broad sense it is clear from the foregoing that in a normally growing typical city certain general territories will be characterized by specific developments which would reflect specific value levels. Nevertheless, cities are frequently developed in a haphazard manner and the regional distribution of land uses might seem to follow no very fundamental principles. The zoning laws are directed toward the correction of haphazard development and they assume that the *laissez faire* principle does not produce homogeneous development. As a matter of fact, the use to which sites will be put does follow some principles in the long run. Just as in the regional distribution of manufacturing industries throughout the country there are principles which tend to locate business enterprises and industries in districts in a city. The real estate appraiser is interested in districts

Appraised by the Inferential Income Process

because they change and because real estate values change with district changes. The essential elements which constitute evidences of urban real estate value are factors which concern districts and district movement. Let us analyze urban district development.

First of all, the creation and continued existence and movement of city districts are not independent or even fundamental in city growth. The relatively permanent and controlling factors in a city's growth are the routes of population movement, to which district developments are secondary and auxiliary. Take, for example, the district phenomena which are observable in properties suited for business sites.

We must define what we mean by "district." There are two concepts of districts. First, we can speak of the "printing district," the "financial district," or the "furniture district," meaning the locality in which most of the business firms in a particular line of business are located. Then we can speak of the "Main Street district," the "Riverside district," the "wholesale district," and so on, meaning the territory occupied by business houses or firms in different lines of business but being neighbors territorially in a region having a unified or semi-unified character.

In some instances the two classes of districts indicated above are identical. In the first case we do not have a true district, in that we do not include all of the parcels of ground. We simply indicate that most or many of the firms in a certain line of business have grouped themselves in a certain region to such a degree that that line of business apparently predominates in the district. Such a district is the printing district, an automobile district, or a financial district. It is obviously an important concept but is not the correct concept to accept as a definition of the word "district." Instead, we shall refer to the concept as a "districted business."

In the second case we have a district in the territorial sense with a somewhat homogeneous character. This concept of district we shall accept—calling it a "business district."

If, then, we are to define a district as a "business district"—an all-inclusive territorial concept—we should expect that it would be possible to bound existing districts in a city. In a sense this is possible, except that the districts are graded one into the other by gradual changes in the character of the utilities to which the land is put. However, the center parts of the districts are easily ascertained and usually the border regions of any district at a given date can be approximately located.

To the valuator the location of the borders of these districts is of importance. He must study the direction of movements of districts and to acquaint himself with this movement he must notice border movement quite as readily as a mutation of the center point.

It should be observed that the location of the approximate border of a district does not imply an imaginary line of demarcation between two districts. Two districts may have several blocks of territory between them which is not characterized by any uniformity—territory which has no district development whatsoever. Not all city territory is districted by any means. District development is not a factor in all city land uses and not infrequently great stretches of developed city land will not exhibit any district phenomena.

The outstanding characteristic of a district is that within its borders most of the business firms make similar demands for sites—and, further, land values are similar. Observation of the districts which have established themselves in a city readily indicates that districted businesses are simply subordinate developments of the business district. A business district frequently does not show a homogeneity of land utility. Apparently dissimilar retail stores line the sidewalks. A cheap office building is located between two high-class wholesale and manufacturing buildings. Across the street the vacant corner is utilized by an oiling and greasing station. Just how are we justified in a concept of any organization into a "well-marked" district?

There are various uses to which urban business land can be put. Some of these uses are more productive than others. The relative advantages of the various locations compete directly for the businesses and values of ground reflect the competition directly. The value of the ground to a specific business enterprise competes with the value of the ground to another business enterprise. The importance of the site to each of the enterprises may be quite different or identical. Sites are probably equally important to shoe stores and haberdashery stores. Location is probably of less importance to the dyer and cleaner than it is to the druggist. The automobile gasoline filling station has to find certain advantages which are of more importance to its operation than are the advantages which make ground important for the motion picture theater. These differing advantages, measured in terms of importance to different business enterprises, cause a general segregation of land utilities. Hence we have districts. The business enterprises located within a well defined district appear to be quite different. The commodities sold show unlimited diversity in quantities and prices. The character of the commodities is diversified. Still, for our purpose, these business enterprises are similar because they make similar requirements for real estate. That is, as a group they represent a level of land use intensity. Lower uses are found only in other districts. Higher uses are found in better districts. The group represents a utility level and in this manner the district exhibits a high degree of homogeneity and uniformity.

We have shown that the apparently diversified business uses to which the ground in a district is put really indicate a uniformity of use based upon the group level of the requirements which businesses make for sites. The businesses are alike in so far as location is of importance to them.

District Levels of Real Estate Value

Now, the obvious corollary presents itself. If a group of site requirements are similar, the values of the sites will be similar. Businesses which introduce a certain intensity of ground use will not compete with each other for the purpose of fixing value, but will, as a group or class, compete for locations against other uses of the ground. The other uses represent more intense or less intense ground uses and are, as a result, better competitors or poorer competitors. The better competitor prefers and is able to go to a higher value district. The poorer competitor is unable to support himself in the district.

Thus each district exhibits a similarity in ground use intensity, and it also exhibits a surprising uniformity in value. The prices paid for sites within the district are the reflections of the use level which is characteristic of the district, and within the borders of the district the values of the ground plots are distinctly comparable and show a variance with the value levels characteristic of each of the surrounding districts.

If, then, each business district is characterized by a distinctive level of real estate value, the value levels of a city may be used as the fixative feature in ascertaining the locations of its districts. In fact, it is possible to define a city primary district as a small region within which the ground exhibits a uniformity in unit value and in which business enterprises make similar requirements for real estate sites.

This means that we have a method of measuring districts and ascertaining their borders with some degree of accuracy. It gives us a partial explanation of the districted business, because the firms which make up the districted business would probably make similar site requirements without any reference to a possible list of advantages which might accrue to them by virtue of close association and proximity *per se.*

The business district which has been discussed might be called a primary district. It is an established zone which exhibits a uniform character. Within this zone various factors of value operate to make the values of specific sites more or less than the value characteristic of the district. The district unit value is the norm. The lot values are variations from the norm. These variations are caused by additional advantageous or disadvantageous features which can usually be classified under "availability" or "accessibility."

Availability and Accessibility

By availability is meant the degree to which a site lends itself to improvement. A site which is remote is not as available as one located nearer to the high value or transportation point in the district. A lot which is small is not as available as a larger one because its size places restrictions upon the character and size of the buildings which can be built on it. An irregularly shaped lot might be much less available than a rectangular one for the same reason. Area, shape, and location in the district are, then, the factors which are concerned in measuring availability, and various degrees of availability operate to make the values of individual sites vary from the norm value which characterizes the district.

By accessibility is meant the degree to which a site is readily reached and entered upon by pedestrians. A lot which is narrow may have a great depth which would render it quite available. Still, it might be decidedly inaccessible because of the difficulty in arranging for people to enter the premises through the narrow frontage. A corner lot is obviously more accessible than a lot inside. A lot near an intersecting street is more accessible to people on that street than a lot more remote from the cross street. Frontage, width of sidewalk, nearness to intersecting streets, the ratio of frontage to area, and similar factors, are elements which are concerned in measuring accessibility; and various degrees of accessibility operate to make the values of individual lots vary from the norm value which characterizes the district.

These two factors show that each site has unique and individual elements of value. The general utilities to which the land of a district is put require a more specific segregation or rather selective sorting to suit the site to the business and the business to the site.

Highest and Best Use

By definition the highest and best use of a real estate site is that use which is most productive. A site is said to be improved to its highest and best use when the structure on it produces a return larger than any other building would. The return attributable to the building is interest earned. The return still remaining is attributable to the ground and is rent. The building which provides the greatest amount of economic rent from the ground is the building which is fitted to the highest and best use of that ground.

The concept of the highest and best use of a real estate site is important. The outstanding test is the improvement to secure the highest net return. Another qualification should also be made, however, namely, that the use must have a reasonable persistence. Where a district is rapidly changing, that use which produces the highest net return now might not be strictly the highest and best use of the site. With this qualification in mind we can now define the highest and best use of a site as that utility which is most productive over a reasonably long and sustained period. Such definition makes allowance for the losses which might be sustained through rapid obsolescence in a quickly changing territory and justifies improvements which anticipate future district uses as the warranted and proper improvements.

The Static City

If we assume that population remains constant, that commodity prices have reached that Utopian state where supply and demand are in such perfect equilibrium that they do not fluctuate, and that all of the dynamic and fluctuating elements of the economic structure were static, then we would find after a time all of the land at its highest and best use. Faulty locations would have been corrected with absolute surety. Rent levels would not change. All building construction would be for the purpose of replacing worn-out building only.

In such a condition the districts of a city would be perfectly obviously defined, and the corollary would present to us a very nearly flat district norm-value which would remain constant. The degrees to which the availability and accessibility factors would operate to change the norm-value in the cases of specific lots would resolve themselves into constants and the value of each site would become a fixed amount, entirely measurable by the income of economic rent it produced.

The Principle of Uniformity

This picture of the static city is given because it points the way to the introduction of an important theory. Let us call the theory the principle of uniformity. It is the theory that the values of real estate in a city are interrelated and graded. In the static situation described the values will be found to have settled into district levels. The more central and most intensively used district will have the highest level of value. Within this district there will be graded deviation from the district value. The next most intensively used districts will probably be found in concentric locations around the central district, and each of these districts will exhibit the graded deviations attributable to varying degrees of availability and accessibility of sites within its borders. Furthermore, these districts will show border values which tend toward a transition into the central district. That is, the value step between districts, while marked, will indicate a grading from the lower to the higher value level. And so on outward toward the edge of the city would be found other lower value districts, probably formed concentrically about the more valuable levels, and these graded in value within themselves, and, at their borders, with adjoining districts. In a very large city there might be a number of higher value districts forming outlying trade centers with clusters of lower value districts around them.

This is the principle of uniformity, important because it provides us with certain rather axiomatic assumptions necessary to the adequate development of a satisfactory statistical approach to the practical study of comparative value analyses (See Chapter XII).

There is, perhaps, another assumption of uniformity upon which the application of statistical method to land economics relies, namely, a theory that in general man acts rationally and uniformly so. We would have to agree to a concept that might indicate that twenty appraisers, working independently, would agree to a penny upon the value of a site. We would have to agree that all possible purchasers would pay the same price for a site. Obviously such is not the case, but we can proceed with a statistical analysis on the basis that the law of averages applies and that the deviations from actual values which people may apply to sites are variations from a normal value and are usually not great. All variations when distributed according to their magnitudes probably correlate very closely with the typical frequency curve of the statisticians and we are warranted in studying the most frequent variation as though it were the actual and only one. In any event, such an assumption of uniformity may not be very far from fact when viewed from the long-time value standpoint.

The static city and the resulting value conditions which have been described are the norm toward which the changing and developing city tends to move. There is a tendency for districts to form as indicated. There is a tendency for each site to be used to its highest and best use. From this point of view the concept of value conditions under a static economic society is enlightening. Now let us consider the value conditions which are introduced by virtue of economic changes; that is, we will analyze the situation under dynamic conditions. These will show certain factors which cause fluctuations in utility and in the resultant values of urban realty, in preventing the norm of static conditions from being reached rather than by any changing of such fundamental conditions.

The Dynamic City

Under dynamic society we have the condition of a developing city in which the characters of the districts are varying and in which population is increasing or diminishing.

In the growth of a city we find that the original districts disappear gradually and are replaced by other districts. In some cases the districts expand and encroach upon others, driving them to new locations. In other cases we find districts dispersed and scattered in such a manner that they lose entirely their character as districts. In some very interesting cases districts slide to new positions, forsaking their original locations.

We have defined districts as value levels created by similar demands made for sites by business concerns and other land users. In a normal city this is evidenced by a central district in which the highest rentals are procurable, which is surrounded by districts of a concentric nature with lower and lower levels the further from the center of the city and the center of population they are. These basic districts in turn are divided and spotted with secondary districts, such as local retail centers. These latter districts are found to be located at transportation points. Local retail trade centers are found at street car line intersections.

And as districts are constantly in a state of mutation, so the highest and best use of particular lots must of necessity be undergoing the same change. The effect which the movement of districts has upon values is not, however, exactly in proportion to the actual changes which occur in districts. The values of real estate are rather affected by the direction which changes in district are *expected* to take. And, further, the increase or decrease in values due to speculation upon expected changes affects the investment in buildings and improvements which are made on sites and will itself have an accelerating or retarding effect upon the movement or change of the district.

Sites tend to be used at their highest and best uses. Hence there is a definite tendency to create distinct districts. The inflexibility of movement of established businesses and the fact that different types of businesses frequently make similar demands for real estate sites causes dispersion and a complexity of districts.

The complexity of districts is reflected in the values ascribed to the lots and offer us the fundamental cause for variations from the principle of uniformity, upon which the concept of comparative evaluation rests.

To the appraiser, an ability to determine what changes will occur in a district—foresight—will be a principal asset. He may be able to ascertain a valuation upon a lot and building based entirely upon present rentals capitalized, and upon the assumption that the present situation is permanent, but to be able to correct this valuation for the equities produced positively or negatively by changes expected and occurring in the district will fit him as a qualified appraiser.

District Mutation

District mutation is the resultant of district growth or reduction. These in turn are the resultants of expansion or contraction of individual business enterprises. When the businesses in an established district develop and become more and more profitable, they expand their operations. Each business unit needs more ground area or more floor area. Competition for the available space in existing buildings takes place, resulting in a more *intensive* use of the ground. Vacant sites are built up. Buildings are built to greater heights and the total value of sites is increased, although rental rates per unit of floor space will not rise much. Such development tends further to establish the district. It is definitely and completely committed to utilities representing a common requirement on the part of the businesses for sites. The considerable amounts of capital invested tend to render the business firms somewhat immobile and to keep them in the district more permanently.

The next development, if the business firms in the district continue to grow or if additional firms attempt to join, is an attempted *extensive* use of ground. The new and old firms locate close to the district but in a neighboring one committed to other utilities of a *lower value level*. Obviously they cannot compete successfully for sites in higher value districts. Thus the district grows and encroaches on the neighboring districts. The neighboring districts can contract or move themselves only to a certain degree. They too have been committed to somewhat definite lines of development and contain relatively immobile businesses. Ultimately the higher utility district will "win the ground" and the lower utility district will encroach upon the next lower utility district. This is the normal slide of districts from one position to another and the gradual movement of districts outward from the center of the city results from the initial business growth in the more central and highest utility district. However, there is the accelerating effect also of the growth of businesses located in all districts. Business growth is causal. It will push all lower value districts outward. It will delay but not prevent the expansion or encroachment of higher value districts.

The rate of district mutation is thus dependent upon the mobility of business firms. The mobility of business firms is dependent upon the investments in improvements which they have created. And, finally, the larger the business units are, the greater the individual investments become and the slower the rate of district movement.

From the foregoing it is obvious that large business investments in buildings, switch tracts, etc., are a retarding factor in permitting the ordinary normal sliding of districts. It would be rather impossible to quickly move the Stock Yards in Chicago to a position more to the southwest. It was only with great difficulty that the wholesale produce commission district was moved out of the downtown district. The fact of establishment is of primary importance, and in estimating or guessing at the future movements of districts the apparent permanence of the business firms occupying the ground will be the principal factor to consider.

Districts move normally by sliding. In every case a changing district first makes a translational movement on the map. However, the ultimate movement of the district may be quite different. We have the phenomena of the "dead" district, "jumped territory," and "district bursting" to consider.

Certain districts seem to change very little, if at all. Other districts do not encroach. The district does not increase or decrease in size. There are few sales of real estate. There is little building construction except to replace worn-out structures. Values do not change greatly. These are called, by most realtors, "dead" districts because they do not offer much speculative real estate. The cause of these districts is the failure of the business firms in the district to grow or expand. Usually they have sharply marked borders (not usually a characteristic of districts in general).

An expanding district grows, first, by a more intensive use of ground, then by an extension. It commences to slide. A rapid flexible adjustment with neighboring districts, which are encroached upon, is rarely possible. The fixity of some neighboring districts demands such a slow change that the growing district cannot make rapid inroads. Given sufficient time, the sliding would continue and the lower value district would retreat to make room. But time is not available and the growing district "jumps" the district which cannot change. Usually the direction of the movement is not changed. The original district passes the other without changing it and establishes itself at a position beyond.

If such a movement of districts did not occur, the levels of value in a city would be rather uniformly graded with the high values at its center. Jumped territory does not change much in value and the phenomenon of "jumping" develops higher value districts at a greater distance from the center of the city than the lower value districts. This movement—jumping—is the result of marked differences in the rate of development of districts and is a primal cause of the outlying higher value levels. There is another cause, however, which assists the same type of movement in the case of sites used for small retail businesses which serve residential districts.

The bursting district differs in concept from the jumping district. In the case of the jumping district, the original district remains intact and rather homogeneous. It slides, jumps, and slides again, resulting in a single district similar in character, but usually larger in area, in a new position.

The bursting district grows and expands until some movement is necessary for further development. The very development which it has made impairs its efficiency in functioning. The business firms begin to leave the district and they individually locate in random positions throughout the city without forming new districts. The original district is rarely destroyed in its entirety, although it contracts to make room for encroaching higher value districts and its character is somewhat elevated.

The typical example of a bursting district is the central retail shopping district of the small growing town. The rising values in the center of the town make it difficult for the small retail groceries, tailor shops, markets, etc., to remain on the best sites. The population has increased and residential locations (the retail trade) have become more distant from the central district. The shopping district "bursts" and the stores locate themselves in clusters in the various residential districts. Some shops remain "downtown" but they cater to an exclusive trade willing to pay higher prices for commodities. That these high-class stores should be the ones to remain is natural. They serve a smaller proportion of the total population and could not be located far from central locations and continue to serve a sufficient number of people in their class of trade.

In this chapter the movement of districts has been discussed. Districts move because of population growth. The manner in which they move is determined by the relative rates of growth of the various districts in a

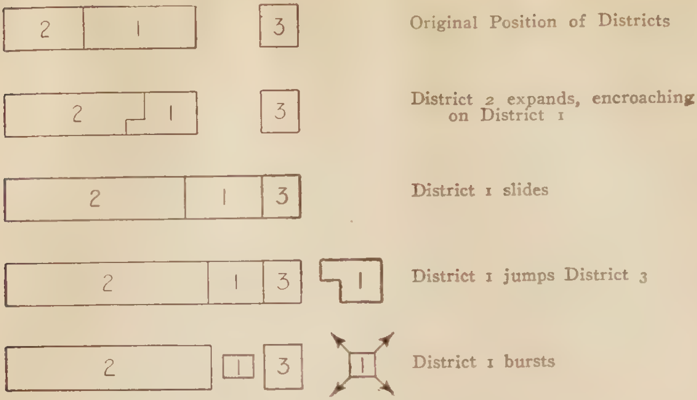

2
1
3
Original Position of Districts
2
1
3
District 2 expands, encroaching on District 1
2
1
3
District 1 slides
2
1
3
1
District 1 jumps District 3
2
1
3
1
District 1 bursts

FIGURE 4: TYPICAL DISTRICT MUTATION

dynamic society or community. An appreciation of the causal factors and the resulting phenomena provides a method for the appraiser in guessing at the future utilities of sites and estimating the period of time which will elapse before changes of utility occur.

The values of real estate sites are the sums of their existing values and their potential values when utility changes. Hence the appraiser should be able to ascertain the character of the future use of the land and the period of time which will be required before such changes will occur.

Changing districts mean changing utilities. Changing utilities mean fluctuating values. The value fluctuations are determined by the actual present rent produced and the expected rental increases or decreases due to changed utility, all corrected for market factors which affect all real estate value levels.

The directions and characteristics of district movements are effective evidences of real estate values. The precise manner in which such movements affect the values of individual parcels of real estate requires some discussion and further qualification.

Regulation of City Growth

The future development of cities is usually controlled to-day by the municipality in some way. There are three general forms of control exercised which affect real estate valuation methods, namely, (1) building codes, (2) city planning, and (3) zoning restriction.

The laws requiring the securing of a building permit before construction and the meeting of certain standards of building construction have resulted in many cities in an observable effect upon building permanence, fire prevention, and sanitation. Buildings are better constructed, more permanent, and usually give the district higher real estate values. The specific requirements of any building code are factors which the valuator can use in computing his estimates.

City planning concerns the laying out of cities and the organization of the continued development of the city from the viewpoint of public property. Thus street widenings, new bridges, new streets, the location of new local transportation routes, the placing of new railway terminals, erection of new public buildings, situation of park and boulevard developments, etc., are provided for in most modern cities by a plan (variously controlled) and by machinery (Boards of Local Improvement, etc.) for the effecting of changes and developments in public property. Such developmental organization lends definiteness to the future trends of much real estate and assists the appraiser in arriving at his estimate of future utility. It is interesting to note at this time the tremendous effect upon the values of individual urban sites, of the detailed plans used in the original platting of the city. For example, the sizes of the lots, their frontages and depths, directly and greatly affect their utilities; that is, the character of building feasible. Again, the lengths of blocks selected may very materially affect the after-development and values. In some cities the original platting provided for alleys along railroad right of ways, resulting in the failure of higher values developing in the adjacent lots. The presence of the railroad prevents any high-value residential development. Commercial utilities usually would not be found on parallel streets and certainly not along the entire lengths of the right of way through the city. Industrial use, the logical development for the land along railroads, is prevented or hampered tremendously because switch track access has been effectively stopped by the presence of the comparatively useless alley. Thus all of the provisions and schemes of city planning and platting can and do constitute very vital elements in real estate evaluation.

That zoning affects real estate evaluation methods is perfectly obvious. As has been indicated, there can be no more important consideration for the play of an appraiser's judgment than his estimate of probable future utility. Zoning provisions definitize district development and specifically restrict the uses to which private property can be put, and the valuator can constrict his zone of error in guessing at the future to correspond with the zoning restrictions.

Unique Elements of Site Value

There are many factors which operate either as positive or negative elements of real estate value and have to do with the site itself as opposed to the factors of neighborhood and district. Many of these are so distinctly unique value qualities and they operate so differently under various conditions that no general treatment of them seems possible.

Among such value qualities are those which have to do with the inherent capacity of the parcel itself in the production of utilities. First of all, there is the quality of the soil, its chemical composition, its drainage, its slope, and its fertility. The ability to produce under cultivation is not a perpetual characteristic of the soil and ground used for farming has few essentially indestructible powers. "Worn-out" land is common and if the essential chemical composition of the land is destroyed by continued predatory cropping, fertility disappears. Fertility returns, however, either by a gradual restoration through natural means or it can be hastened by fertilization. The rotation of crops is another artificial means for the restoration or preservation of productivity. More elaborate rotation of crops, deeper plowing, systematic draining, more abundant and more carefully selected fertilizers do tend toward the perpetual preservation of the productive capacities of land parcels used for cultivation of products. Thus the relative fertility of the soil and the relative permanence and costs of maintaining fertility on a parcel become important factors in land value.

A similar consideration appears in timber and mining properties. Timber land and mining lands have inherent value qualities which are not replaceable. Reforesting requires considerable lengths of time, and proper and sure reforesting usually requires governmental control. From the real estate point of view the value of timber land is the value of the standing timber plus the value of the ground less the cost of clearing. From this point of view the timber value is destructible. In mines the value inherent in the ore deposits is likewise destructible. As mining operations progress the deposits diminish and can never be replaced. Even though the deposit be almost unlimited in extent, the rising costs of extraction from greater depths and under less convenient conditions lower the value of the land. Quarrying under certain conditions can almost utterly destroy any vestige of real estate value.

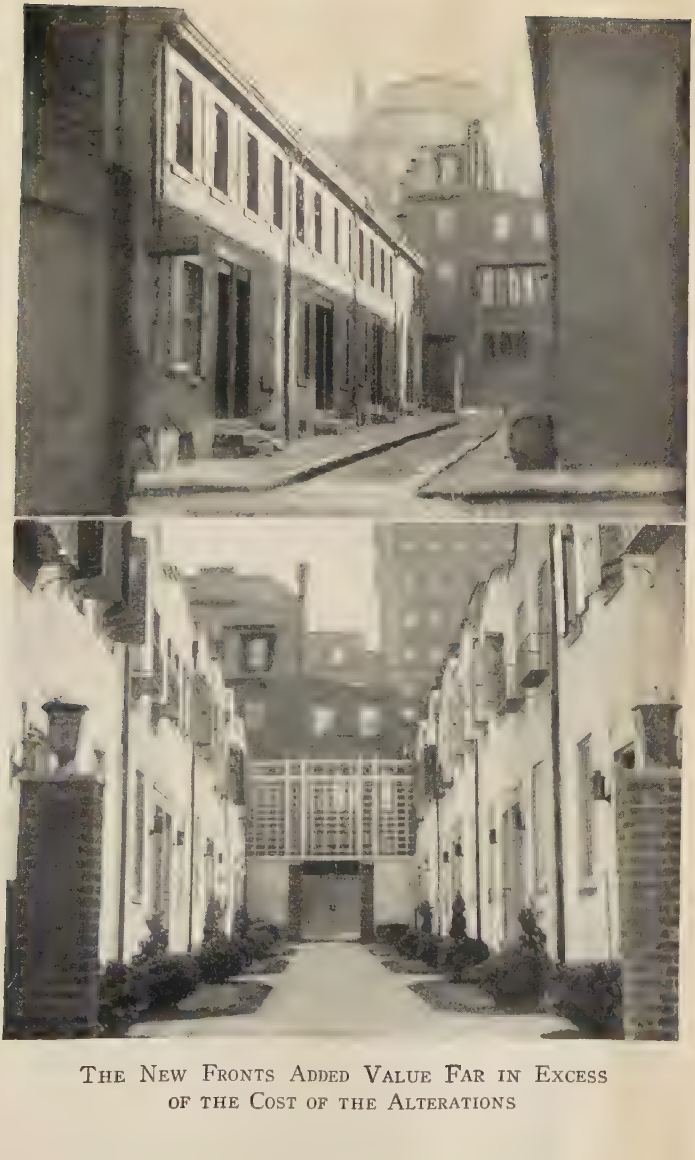
These are factors of value arising from the inherent qualities of the land parcel. A second factor of this kind has to do with the shape and area of the parcel. This element will not affect the values of rural sites greatly except in the limiting extreme cases such as the isolation of parcels too small to farm efficiently. It concerns primarily urban sites. City locations depend for value upon their productivity in the form of convenience in business, industrial or residential life. Fertility is not considered. Their productivity is derived from building improvements. The physical limitations determining the kind of building which can be constructed on an urban site are the area and shape of the lot. Smallness of plot limits not only the area per floor but also the economical height of a building. Very high buildings require considerable ground area to be warrantable investments. The loss in the percentage of rentable space as the building height rises is directly a reflection of the size of the lot. The shape of the lot similarly has its effect. Very peculiar lot shapes usually impair value. Even a rectangularly shaped lot in which the ratio of frontage to depth is far from a normal ratio suffers value impairment. In the more intense use districts the effect of the frontage dimension alone becomes a primary value factor because of the importance of display and accessibility in the sale of commodities.

The fact that lot dimensions, proportions and sizes are elements of urban real estate value does not need further proof. All real estate operators, users and brokers know this. But the principles which seem to govern these factors and their measurement do require some study. Such studies can be followed by means of comparative analysis. By assuming the area, shape and dimension conditions to gradually change throughout all phases, we can watch the effects of such alterations upon value and get at any principles which exist. Thus we study each lot dimension element (See Chapter XII), allowing it to pass through all its phases to ascertain the nature of its effect upon value. For example (the common example, by the way) we will assume the depths of similar lots to increase and we will discover that value does not increase at as rapid a rate as depth. We will permit area to increase and will discover that value increases with greater rapidity than the area. This second example is the plottage phenomenon and shows the effect of the combinations of smaller tracts into larger ones. In urban real estate there is no wholesale price for large areas. A large order not only does not carry with it a discount in unit price, but actually involves, up to a certain point, an increase in unit price. Where two small lots are side by side, each with a frontage of 20 feet, each might be salable at a price of $10,000. But the combined lot with a frontage of 40 feet would be salable at more than twice the price of a single small lot. It would probably have a value, say, of $25,000. The excess $5000 is known as the plottage increment and is derived from the additional capacity of the combined site in utility. Its source is ultimately found in more efficient building construction, savings in unit managerial costs, capacity to build higher, and a decided increase in the ratio of rentable space to total space. Thus in urban property a second set of factors having to do with the inherent qualities of the site, namely shape, area and dimensions, become vitally important elements of real estate value.

Still a third set of factors may be introduced. These have to do with the relation of the lot to the immediate district—they are access factors. Sites with access to two streets, either as corners, running through from block to block, or as "L-shaped" tracts receive additional value derived from greater contact with people. The presence of alleys, the width of the sidewalks, the widths of the streets, all are primary value factors having to do with access, light, air and affecting the possible utilization of urban sites.

The Effect of Buildings on Land Values

This introduces another group of value factors—elements of value which are associated with physical improvements. Buildings are separable from ground only at a considerable cost and sacrifice. The relative permanence of districts even in a comparatively rapidly growing city was the result of the relative immobility of established uses and the investment factor. The controlling effects upon the value of a lot, of the improvements on it and adjacent and neighboring properties is obvious. A splendid modern building in the same block increases the ground value of the lots. An improper, old or an "eyesore" building impairs value. The commitment of sites to specific uses by the presence of buildings affects value, then, by its effect upon the time of realizing full values. Note the effect of buildings upon the plottage increment. Assume the two lots to be built up with two buildings. The value derived from combining the lots was ascribed to greater utility of the larger lot. Such greater utility can only be realized by the combined development of the sites, and their present improvements may



The New Fronts Added Value Far in Excess of the Cost of the Alterations

be very effective delaying factors. That such factors are important is shown by the use realtors make of such expressions as "improved value," "postponed development," "built territory," and so forth.

The increment of value which is indicated by the term "improved value" is one which owes its existence to the efforts of a promoter and the hazard which he has taken. By improved value is meant the difference between the actual market value of an improved property and the sum of the value of the land as vacant ground and the cost of the building. A property which is improved to its highest and best use is frequently salable at a price in excess of the amount which would have to be expended by an individual if he were to purchase an identical vacant site and build an identical building. The excess value is the improved value increment and exists as the salable services of the promoter who committed the site to the utility. He contributed value in the form of good judgment. He assumed risk. He was successful with his enterprise and realizes his profit directly in improved value. Thus improved value, while it cannot be allocated either to the land or building, exists by virtue of good business judgment manifested by the combination of the particular lot and the particular building, and is therefore allocable to the combination as such.

Other physical improvements than buildings may have similar value effects. The precise point of departure from the railroad of a switch track into a factory property would constitute a limiting feature.

There are always peculiar elements which affect the values of sites. These elements cannot be easily classified. Public buildings, monuments, parks, and the presence of other well known interest points reflect a value to neighboring sites. Some sites are likely to be condemned by the city or government for street improvements or railroad right of way. Value is affected. The condition and character of the title to a property is an element of value. Clouded titles are not easily marketable. It is even true that many buyers are suspicious of certain forms of registered title systems, and value of real estate may be affected by a limited market.

Established Use Value

An interesting and rather intangible value factor is that which certain sites enjoy in commercial districts—the value resulting from the long-continued and established use of the location for the conduct of a particular line of business. If the people in a district have long been accustomed to the presence of a drug store on a certain corner they habitually seek that corner for a drug store. A trade has been established for the location. Obviously a part of this trade is the peculiar goodwill of the particular drug store proprietor who has created the business, but a portion of it is a part of the real estate and would still accrue to the value of the corner even after a new proprietor had rented the site. The established trade value of a retail site has its existence in the habits of the people of the community and any sustained interruption in the practice of the habit might very soon destroy it. Nevertheless, we may very properly consider it an element of real estate value. In the sense of district value it is a very genuine factor and alone could maintain the location of a central retail district.

The Effect of People on Values

In the final analysis the values of real estate are dependent upon people and the movements of people. Factory site values are affected by labor supply. Residential values are affected by racial and religious factors. Commercial property values are dependent upon access to buyers, and all are dependent upon transportation facilities. The urban land utilities do make various requirements for sites, but each of the competing requirements can usually be stated in terms of a relationship of the site to people. A garage utility or a gasoline filling station utility seeks location near people—but always people where they are in their automobiles, or where they wish to leave their automobiles. A barber shop utility seeks location near people—but usually near men with time enough to enter and be shaved. A home utility seeks location near people—but always near persons of the same social standing, same races, near to churches, schools, and all phases of social life and with access to places of business and shopping. A department store utility seeks location near people—but usually at a point where a large number of women will come to shop. And so the habits, the character, the race, the movements, and the very moods of people are the ultimate factors of real estate value and locations can all be studied in terms of human behavior. Too frequently we hear the presence of people advanced as the explanation of urban real estate values without specific qualification as to the nature of the effect of people. The real factors are buying mood, hours, purchasing power, motives at the moment, directions of movement, race, occupations, religion and standards of living. Precise results have never been secured from any pedestrian traffic counts. There is correlation, of course, between mere numbers of people and real estate value, but all such studies indicate that the characteristics of the people are greater factors than the mere fact of numbers.

In this chapter it has been the object to show the character of the elements out of which real estate values are built. Most of these elements have been factors which affect the present and future utilities of real estate sites. City growth, district phenomena and specific value factors which tend to determine the possible utilization of sites have been discussed.

The appraisal procedure consists of the combining of these factors of ground utility with market forces and considerations into a scheme for the estimation of real estate values, to which subject matter we now turn.

CHAPTER IV

APPRAISAL PROCEDURE AND METHODS

The actual processes and methods which can be used by an evaluator are many and as has been indicated in Chapter I the primary requisite in the use of such methods is the application of a logical process of thought, that is, a deliberate definite line of reasoning from cause to effect. This chapter will deal with appraisal procedure and methods with particular stress upon the organization of thought and method.

There are various processes used by valuators in making appraisals and they are applicable under various conditions. It is important that a valuator select a correct approach and method in each case, and that he organize his work in accordance with a deliberate program of procedure. It was stated in Chapter I that the student of valuation methods was interested in two things, viz: (1) the amount and character of data which is necessary as evidence of value and the method of testing such data, (2) the processes of logic which should be used in building the data into value estimates. He is, of course, also interested in the kind of report which he is to send to his client. Thus the program of procedure in the making of an appraisal can be divided in three successive subprograms:

1. *The Data Program.*—The selection of sources of information, the collection of data and value evidence; the checking and testing of data; in a word, the investigation and research angles of the appraisal procedure.

2. *The Computation Progam.*—The selection of an appraisal process; building the data secured into a value estimate by means of the appraisal process selected.

3. *The Report Program.*—The selection of those elements of information, etc., which are of interest to the client—briefing the final report to meet his requirements—delivery of the report—service required after the delivery—preservation of data, etc.

Each of these programs can be followed with deliberate forethought.

The Data Program

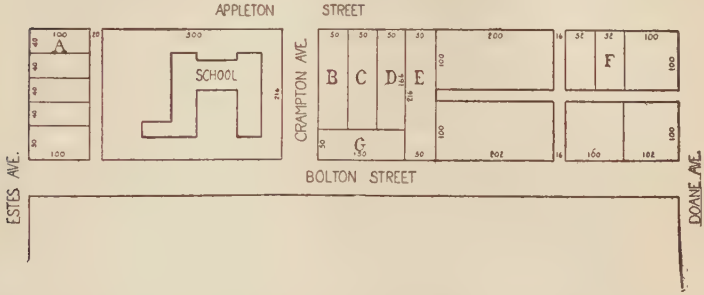
The kinds of data and the items of information which the valuator must secure before he proceeds with his appraisal may be quite different in different cases, but usually he will attempt to obtain some information affecting every phase of the property's value. He will rely on such information a great deal more than he will upon his unsupported judgment. The information secured will consist, first of all, of a complete description of the property, its legal description, street address, size of lot, description of building, a statement of income and expenses, copies of leases, data concerning mortgages, and, in fact, all manner of data having to do with the specific property. Secondly, he will obtain information concerning the trend of development of the district in which the property is located, including present uses of sites, public improvements in progress or contemplated, zoning restrictions, other restrictions (as in subdivisions), contemplated and existing local transportation facilities, racial movements, pedestrian traffic data, and, in fact, all manner of data concerning the neighborhood and its future. Thirdly, he will secure all of the information possible which has a bearing upon the real estate market conditions in the district. He will collect as much data as possible regarding sales of real estate, new leases, asking prices and offered prices, kinds of buyers whose attention has been attracted to the district, the volume of sales, and, in fact, all manner of information which helps him to visualize the particular market for real estate in the particular district.

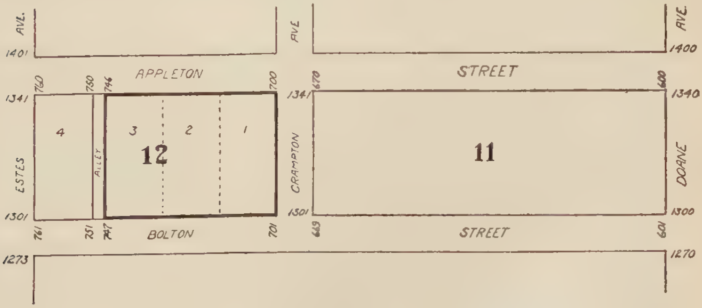
It is obvious that much of the data which are required will affect the values of many pieces of real estate in the neighborhood and that such information can be collected as a routine of office management to be used when an application for a valuation is made. So the appraiser's own files of information will be one source of information.

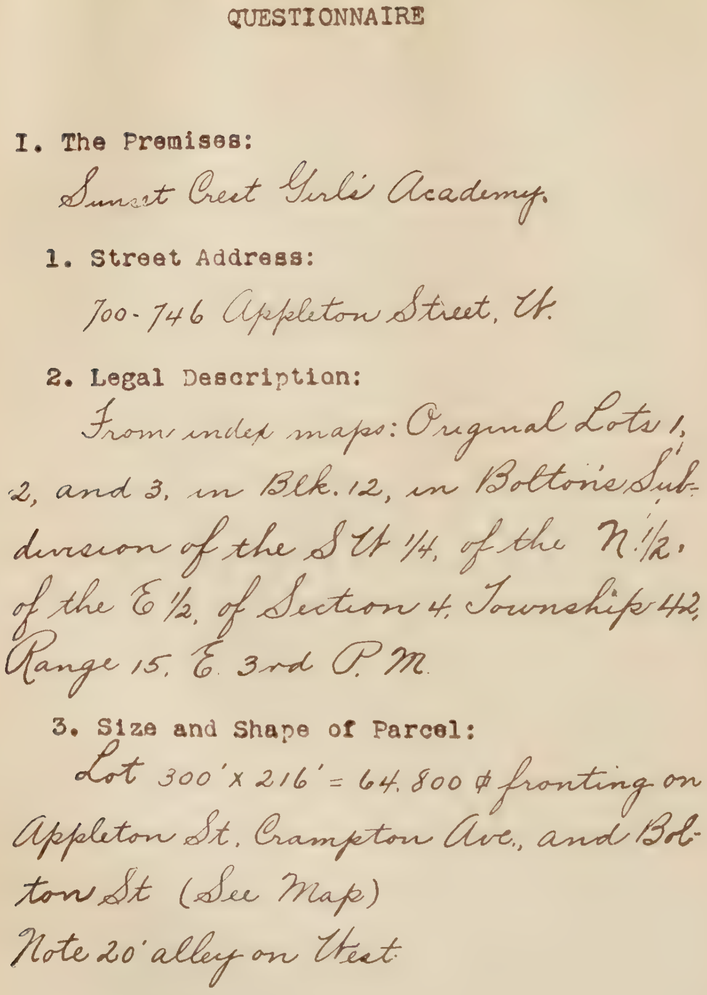
An office which specializes in appraising will keep a record of transfers and leases, classified for ready reference according to streets and districts. The transfer file, so called, can be most easily maintained by clipping the newspaper reports of sales and pasting them into the classification system. Such data is usually somewhat unsatisfactory in most communities inasmuch as the true considerations in sales and leases are not always reported. In some cities the only clue to sale price is the amount of the revenue stamps put onto the deed and the encumbrances which the property bears, and sometimes the true consideration is hidden by the buyer and seller. Thus in using data on transfers the appraiser attempts as far as possible to check the data he has by finding out, frequently from the buyers, sellers, or brokers in the deals, the true considerations, and likewise he attempts to discern whether or not the sale was a typical sale unaffected by peculiar circumstances. Forced sales, such as tax sales, sales by order of courts, etc., are never reliable data. Sales by auction are rarely reliable evidences of the genuine general real estate market. If the valuator discovers that the seller was in great need of funds at the time of the sale it is probable that the sale price is lower than would be typical. Again the purchaser may have been in a position where he was warranted in paying a price greatly in excess of a fair cash market price. In this manner each sale price which is accepted by the valuator is tested and corrected to get at the typical prices which are characteristic of the district. Further corrections in transfer prices are made in the process of reducing these data to comparable terms. For comparison each sale is disintegrated into a unit value for the land and building and the value per front foot (for example) of the land can be corrected for varying depths of the lots (See Chapter XII).

The office files will also contain a fund of information concerning the general trend of development in the district. There will be complete data in the form of maps and plats, showing the streets, alleys and the widths of the same. The office will also have considerable data concerning zoning restrictions, public improvements, news clippings referring to the district—its new buildings—its civic betterment plans, its trade, etc., all of which can be reduced to the terms in which it affects the future use of the property.

Usually the valuator exhausts every form of data in his own office first. He will list and test the transfers; he will make notes concerning the developments in the district, and with these initial data at his disposal, can then deliberately write a questionnaire form to follow in securing the remaining data necessary to proceed. After having completed his questionnaire he will go to the sources other than his office and will secure the information. He becomes, not an appraiser who looks at the property immediately and applies his judgment as to value, but rather a research investigator occupied solely with the gathering of data and their orderly classification. An example of a typical questionnaire, which might be used, follows. It will serve to show the data which are secured, the sources to which the appraiser goes, and the orderly classification of the data in terms which will permit its most efficient use when the appraisal process is applied to it. Obviously variations in such a form would be necessary in its use to secure all of the data in different kinds of property and the example used here for illustration applies to the data which would be secured in the appraisal of a private school property.







QUESTIONNAIRE

I. The Premises:

Sunset Crest Girls' Academy.

1. Street Address:

700-746 Appleton Street, W.

2. Legal Description:

From index maps: Original Lots 1, 2, and 3, in Blk. 12, in Bolton's Subdivision of the S W 1/4, of the N 1/2, of the E 1/2, of Section 4, Township 42, Range 15, E. 3rd P. M.

3. Size and Shape of Parcel:

Lot 300'x 216' = 64,800 ¢ fronting on Appleton St, Crampton Ave., and Bolton St (See Map)
Note 20' alley on West.

4. Description of Building:

Plan is symmetrical except for the wing at the southwest corner, which houses the study on the first floor and library on the second floor. The building is a three-story one with English basement, and is subdivided as follows: In the basement are located swimming pool and dressing rooms, locker rooms, trunk room, heating and ventilating apparatus rooms, coal space, laundry and drying room. The heating system for the building is low pressure steam furnished by two cast iron boilers. Domestic hot water is furnished from a combination coal heater and garbage burner and a 1000 gallon hot water tank.

In the first story, the floor of which is 6'0" above grade, the following rooms are located: Entrance hall, waiting room, business office and teachers' room, principal's room, supplies room, gymnasium (extending two stories in height), the study and a few class rooms, also toilet rooms.

In the second story are located special class rooms, chemical laboratory, physical laboratory, music room, cooking room, the library, main dining room, kitchen and service, also the principal's sleeping quarters and balcony in gymnasium, also an alumnae room.

The third story is entirely given up to sleeping quarters for students, with toilet rooms.

The exterior of the building is of red brick with stone trimmings and is designed in the English Tudor style of architecture. The roof is of slate. The building is of fire proof construction - concrete floors with finished wood floors in all rooms. The corridors, toilet rooms, etc., have floors and base of terrazzo. The entrance vestibule and hall have marble tile floors with marble base.

The stairs are of reinforced concrete with non-slip terrazzo treads, iron railings and wood handrail

The property is surrounded by a brick wall 4'0" high with ornamental iron railing 6'0" high above. Brick piers with ornamental stone caps occur at 20'0" intervals in railing.

5. Existing Leases:

Owned in fee simple by the Sunset Crest Girls' Academy, an Iowa Corp.

6. Incumbrances:

From County Recorder's office:
1st Mtge. (A. T. & T. Co.) Balance remaining – $28,500 due in 1929 @ 6½%.

7. Statement:

Mr Gordon offers expense statement if we need it. There are special assessments (City Recorder's Office) as follows: For the widening of Estes Ave. two installments, each for $198.23, due 6/1/25 and 6/1/26.

8. Present Utilization of the Premises:

The site is occupied by the Sunset Crest Girls' Academy who have owned the ground since 1872

II. Data Concerning the District:

1. Maps, etc.:

City Plats (See maps below.)

2. City Planning, Zoning and Other Restrictions:

The widening of Estes Ave. will have been completed by June. (Plan Commission.) 18 ft. is being taken from the west side and added to the roadway, making it possible to complete the Estes Ave. bridge 10 blocks north. This bridge is to be built by the State and it is probable that work on it will commence sometime during the ensuing two years.

From Zoning Maps: Appleton St is zoned for apartments (See zoning map below.)

3. Utilities in the District:

Appleton St. is residential, apartments, churches, etc. So likewise are Crompton and Bolton. Doane Ave is beginning to show signs of a retail development, there being six stores in two new bldgs in the block south of Bolton Ave. It is contemplated that a single store bldg. will soon be built at the N.E. corner of Bolton and Doane Ave.

Estes Ave is a retail business street; the retail center and most valuable part of the street is 3 blocks south. The stores extend as far as Appleton St. and will soon be developed further. While the lots on the east side of Estes between Bolton and Appleton are zoned at present for apartments, there is an appeal before the Zoning Commissions to permit two story store and apartments along this frontage. Decision has not been reached (From Clark.)

The entire district is apartments and houses mixed and of all ages, ranging from old frames to brand new bldgs. There are few very fine individual residences in the district now and the few remaining are north of Appleton St.

4. New Buildings:

The new M. E. Church on Crompton St one block north of Appleton St is under construction.

New six flat bldg just finished at 660 W Appleton St. New store to go at N E Cor Bolton and Doane. No new single homes planned at present Year ago stucco house at 1422 Crompton.

5. Transportation Facilities:

Estes Ave is through blvd. artery N & S No parking restriction.

Street car line E. & W. 3 blocks south 15 minutes to the Central Business District Garage on Estes Ave. 1½ blocks south. There is a sub-station of the Ralston Electric 2 blocks east but only the local trains stop, except during the State Fair.

6. Population Considerations:

Residents in district are middle class Americans—bank and office employes, merchants, etc.; few with very large incomes.

With the exception of the old residents, they are tenants for the most part. South of Bolton St. there are beginning to be a small number of Italian families, mostly the foremen, etc., in the Patinini Metal Works over in Netswick. The Parents and Teachers Association over at Crompton School, the Northwest Men's Club, etc., show a fair civic and community interest The merchants have recently organized the Northwest Commercial Association which has the widening of Estes Ave to its credit. They're a live crowd No clubs in immediate district. No churches in immediate district except the new M. E. Church and the Baptist Chapel at 631 Appleton St.

7. General Statistics:

Omit looking up.

III. The Real Estate Market:

1. Transfers:

All within the last year. Letters refer to the map below.

a-1341 Estes Ave. 40x100 – 8/21/23
Old improvements-valueless-$38,000
b-670 Appleton St.-50x166-6/6/23.
Vacant - -$44,500
c-666-68 Appleton St. 50x166-5/4/23
Old frame house (may have some value)-$32,000.
d-662 Appleton St.-50x166-10/10/23.
Vacant - – $25,000
e-656-58 Appleton St & 655-57 Bolton St.

: 36-24 flat bldg. - 9/19/23
Rents No 1 Bldg 7200 - 2d Bldg 4500 - $45,000.
f - 28 Appleton St - 52 x 100 - 9/4/23
Vacant when sold (now apts.) - $20,000
g - 1301 Crompton St & 661-64 Bolton
St - 9/1/23 - N. E. Cor Crompton
& Bolton Sts 50 x 130 - 2 old
frame dwellings - — $28,000

2. Leases:

No new leases on land.

3. Asking and Offer Prices:

McCorkle is holding all his stuff at $400 per fr ft.

4. Number of Transfers:

Our office files show:

No Transfers	Blk 10	Blk [illegible]	Total
1920	0	1	1
1921	1	0	1

1922	2	3	5
1923	1	5	6

The effect of the zoning has been apparent in interesting buyers in the district For several years an increasing number of sales may be expected. Market active.

5. Character of Real Estate Buyers:

Of the six transfers this year the buyers represent:

3 speculators.
2 who bought to improve.
1 investor.

The market may be said to be among both users and speculators at present and prices have not indicated much rise due to speculation so far, but it may raise prices.

6. Other Valuations:

Brown and Petrie, appraising for the Board Committee, put a value on the S. E Cor. of Doane and Appleton of:

Land	$ 20,000
Bldg	52,000
Total	$72,000

18 months ago. Brown always shoots too high, particularly when appraising for loans.

Mr Gordon, Secretary for the Sunset Crest Girls' Academy, requested our valuation as of April 1, 1924, for inventory purposes as a part of a statement to the trustees. We told him we would try to get a report to his office before that date. See corres files.

Such a questionnaire to follow gives the appraiser a scheme into which to fit the data he collects. By using it he does not forget to obtain certain elements of information, and when he has finished he has his data in a classified form for ready use.

The questionnaire should always fit the character of the property. In some properties other sources and other items of data would be desired.

Important sources of information which are of value to the real estate evaluator are the following:

1. *General Sources.*—Talking with owners and tenants of adjacent properties; interviewing of local real estate brokers. Consulting newspaper editors and information bureaus. Securing statistical data by writing to other cities for comparable data, etc.

2. *Public Agency Sources.*—The City Hall or County Building gives the amounts of taxes and special assessments. The Map Department and the Building Commission assist. The Zoning Commission and even the Health Department may have information assisting in appraising. The Board of Local Improvements is an obvious source of data. For the appraiser of farms the Farm Bureaus and the U. S. Department of Agriculture are sources of data.

3. *Private Agency Sources.*—Insurance company maps, bankers, the local title company, etc., are ready sources of real estate information. Note also architects and builders.

4. *Trade and Professional Associations.*—The local real estate board, the State and National real estate boards, building managers' associations, chambers of commerce, manufacturers' associations, and many trade associations are very valuable sources of information.

5. *Private Services.*—The employing of architects, engineers, contractors or builders, and accountants by real

estate appraisers, is to be highly recommended. The estimation of structural value in very valuable buildings cannot come within the special field of the real estate appraiser. There similarly are accounting problems sometimes introduced which warrant the employment of a public accountant.

The appraiser having thus secured his data is ready to proceed with his valuation. To-day too many appraisers neglect the importance of adequate evidences of value and likewise fail completely to see the value of organizing their work. Given the data with which to work, the valuator selects a scheme of procedure or computation.

THE COMPUTATION PROGRAM

No single method of appraising real estate can be selected as the correct process for the reason that no process can be made to apply to all kinds of real property. For example, the value of a commercial store property could be computed on the basis of its income, while the value of a home cannot be approached through income. Again, the value of a hospital might be secured by an analysis of the income value of a similar structure on the site used for a typical business use, while the value of a farm could be estimated only on the basis of the going prices which make a market for farms. Thus, of necessity, there are many ways of proceeding in an appraisal and in each instance there can be and is a preferred method, but there can be no general process capable of universal application.

The appraisal processes which are used by appraisers follow. Each method has been classified under one of four headings, as follows:

1. Methods applicable to land.
2. Methods applicable to buildings.
3. Methods applicable to total value of improved properties.
4. Methods applicable to land through the value of improvements.

We will describe briefly and discuss the processes, making some reference to the instances in which each process would be the preferable procedure. We will also explain certain cases where the method is positively incorrect.

Appraisal Processes

I. Methods Applicable to Land Directly.—This group of appraisal processes applies to vacant land. It can be used to find a value estimate for land under any conditions, but is recommended for grazing and waste land, unimproved farm land, timber lands, truck garden land with a remote urban utilization, subdivision acreage, subdivision lots, lots for use of individual dwellings, parks and "accommodation land," etc. These methods involve a comparison between the sale prices of similar land and the qualities of the land under consideration.

Process No. 1—Recent Transfer Method.—Secure data showing the sale prices of similar vacant land, asking prices, offer prices, etc., all of recent date. Reduce these prices to unit prices for comparison and then integrate a value for the land in question from the unit price average.

This process involves comparative value analysis, described in Chapter XII. It appraises by applying the existing real estate market in the locality to the land. The value estimate is not dependent upon an analysis of the use to which the ground may be put, but is based upon present market.

This is undesirable as a process when any other approach can be made, but will have to be used as the only available process for grazing and waste land, truck garden land with a remote urban use, subdivision acreage (in some cases), subdivision lots, lots for individual dwellings (in most cases), and park and accommodation land

Process No. 2—Long-Time Transfer Method.—Secure data showing the sale prices of similar vacant land, over a considerable period. Reduce these prices to unit prices for comparison and plot the unit prices in some manner to show the trend of prices over the period with violent fluctuations from the trend left out. The value of the land in question is then integrated from the unit price indicated in the current part of the trend.

This process involves comparative value analysis again (Chapter XII). It appraises by applying the long-time real estate market trend in the locality to the land. The value estimate is not dependent upon an analysis of the use to which the ground may be put, but is based upon the market trend which eliminates any existing fluctuation from the normal levels of value and thereby reflects the probable use value of the ground.

This process is not applicable to land which has undergone any great change in possible utilization. Constant or quasi-constant conditions are assumed in it. The process is frequently difficult of application because of the lack of sufficient reliable data.

Usually it is the preferable process in the valuation of unimproved farm lands, timber lands (frequently), and rural tracts under cultivation but without building improvements, fences, etc. The same process is applicable in a sense to the discovery of rental rate trends (See Chapter XII—gross rentals). The application of the process is illustrated in Chapter IX.

II. Methods Applicable to Buildings.—This group of appraisal processes includes those applicable to the values placed independently upon buildings. Many of the books upon valuation method make the statement that land and buildings should be valued separately. It is preferable to appraise the total values of properties directly rather than to appraise the ground and improvements separately. There are a relatively small number of cases in which it is necessary to appraise the building separately, and the following methods of appraising buildings are used in such cases.

There are three approaches to building values: (1) An estimate predicated upon the expense of constructing the building, (2) an estimation predicated upon comparison, and (3) an estimate predicated upon the utilizational possibilities of the structure. The first two processes below are based upon cost of construction; the third upon comparison; and the fourth and fifth upon productivity through use.

Process No. 1—Cost of Construction Process.—This is the process of appraising in which the building is made exactly equal to its cost of construction. The valuator secures the figure from an architect or engineer or accepts the actual amount of outlay made.

The process has but one application—namely, to secure a value estimate for a building which is just completed, which can be proven to be the unquestioned highest and best utility for the location, and at a time when building costs will probably not fall greatly for some time. The process also assumes that the building construction cost, which includes architect's fees, interest during construction, and all capital expenditures which become a part of the permanent investment overhead, was not different from the going construction cost rates, and that additional expenses such as strikes, etc., were not encountered.

Obviously this is a very limited process and one in which the actual fixing of the amount becomes the function of architect, engineer and accountant, rather than real estate appraiser.

Process No. 2—Reproduction Cost Process.—Under this process the value of a building is estimated as being equal to its reproduction cost new less an amount for structural depreciation. The valuator secures his estimate directly from a qualified architect or engineer or uses his own construction cost knowledge in making the estimate. This involves a knowledge and record of the going costs of building construction in terms applicable to the kind of real estate under evaluation. In smaller buildings costs per square foot are usable units. Some use and keep track of construction costs in terms of cubic contents of walls, foundations, etc. In somewhat larger buildings the cubic feet of total volume can be used. How the reproduction cost new is computed is described in examples. The depreciation deduction made is not the annual cost item used for accounting purposes. It is a deduction which measures the amount of structural destruction that is assumed to have occurred up to the time of the appraisal and has nothing to do with the amount of depreciation sinking fund which has accumulated (See Chapter X).

This process can be used properly only in those cases where the valuator can demonstrate to himself that the building constitutes the highest and best utilization of the site. It gives a value figure which the accountant cannot use because it does not represent an actual investment. It may indicate an appreciation or depreciation of the original investment, but the new value cannot be used in accounting unless a sale at the amount is actually consummated.

The process is preferably not utilized when a building has a commercial real estate income. It is therefore particularly useful in appraising buildings which are not typical income utilities, such as schools, churches, clubs, hospitals, public buildings, railroad terminals, etc.

There is a similar process suggested—namely, the process of finding the reproduction cost of construction less depreciation by utilizing the long-time trend of building costs. Such a process can have merit, but is undoubtedly an attempt to secure too great a refinement of measurement for practical appraising.

Process No. 3—Price Comparison Method.—By this process the valuator secures data showing the prices ostensibly paid for buildings in recent transfers of real estate in which the buildings are comparable from a structural point of view. He then integrates a value for the building under consideration by using his units of comparison (the square feet, cubic feet in walls, or cubic feet of volume, etc.). He selects buildings for data in which structural deterioration has taken place to about the same degree as in the appraised building.

The process is one which attempts to introduce a "buyer's estimate of depreciation," and it is a process which is highly impracticable and is never the correct method of approach.

The process is applicable, however, in one form of analysis. Old factory buildings and buildings which are fitted for few typical uses may have some value to prospective purchasers and in any particular instance a valuator would be interested in knowing the extent to which such buildings have sale values to particular kinds of buyers. This process, thus conceived, becomes merely a subordinate phase of analysis in the next two processes.

Process No. 4—Multiple of Rent Process.—This process is used to place a value estimate upon very old urban structures which encumber the ground. Where obsolescence has long since set in and the building is manifestly one which should be removed to make room for a correct utility no value is given by most appraisers to the present building. It is certain that no prospective purchaser will include any amount in his estimate of the value of the property for the presence of the building. To him it has no value whatsoever if he contemplates immediate reconstruction. To the owner, however, the rents which the old building produce are an item of value although they are pitifully less than a fair return on the value of the property and may be only a small portion of the amount which he pays out in the form of taxes. Under such circumstances a fair cash market value would include no value for the building. It is not salable.

If, on the other hand, the rents secured from an old building are of sufficient amount that a purchaser would be inclined to consider them as a factor the old building has a market value. If the cost of carrying vacant ground is reduced to a loss of interest only, that is, if the rents procured are equal to or greater than the tax bills, then the purchaser might be expected to pay for the building. The minimum point at which the valuator is warranted in giving any value to such a building is at that point where, in the particular case, a purchaser would give any attention whatsoever to the rental.

If the rents are above this point the simplest device used by appraisers is to estimate the length of time which they believe would normally intervene between the time of the valuation and the rebuilding of the site, and to let the building value estimate be equal to the rent obtainable in such a period. Thus one year's or two years' rent would be accepted as the building value. Greater refinement of measurement is unnecessary inasmuch as the process is only applicable where relatively small amounts are involved. If larger amounts of value are involved the process becomes the incorrect one and the following method of analysis would be preferable.

Process No. 5—Annuity for Life Process.—In this process the appraiser estimates the probable remaining life of the building and computes the present worth of an annuity representing the net annual rental over the period, after deducting from the net rental a fair return on the value of the ground.

The process is not applicable to property which is improved to its highest and best use, nor is it applicable to buildings until they are relatively old—old enough so that the probable remaining life is genuinely possible to anticipate. Thus the process is used to estimate the value of buildings which have a very genuine value remaining but which are not destined to be suited to the site for long. The presence of commercial rent is necessary, too.

An example will explain the use of the process. Assume a building which produces an annual net rental of $20,000 with a probable remaining life of five years. Assume the building to occupy a site which, if vacant, would have a value of $300,000. If a fair rate of return on the value of the land is 5 per cent, the property produces $5000, which is the annual return on the building. If a fair rate of return on the value of the building is 8 per cent, its value can be found by computing the present worth of an annuity of $5000 per year for 5 years at 8 per cent. The building value would be $19,963.55.

We have, then, five possible processes for the computation of the values of buildings. The process of computing values of properties by adding separately computed values of land and building is rarely the correct procedure. Ordinarily the computation process should involve first the computation of a total value.

III. Methods Applicable to Total Value of Improved Properties.—This group of appraisal processes gives the total values of improved properties.

Process No. 1—Summation Process.—The appraiser finds the value of the land by the recent transfer or the long-time transfer methods and the value of the building by one of the five processes given above, and adds the two amounts to secure his total value estimate.

This process appraises by summation or integration and its use is limited. It is the preferred process, however, in the valuation of improved farms except in such cases as those in which a reasonably reliable figure representing the net return from the farm is available. In the appraisal of improved farms by the process the value of the land would best be found by the long-time transfer method and the value of the buildings by the reproduction cost process except where the buildings were not adapted to the farm (See Chapter IX). The values of individual dwellings could be computed by the summation process, although it is certainly not the best approach to utilize.

Perhaps its most important application is in the valuation of schools, churches, public buildings, clubs, railroad depots, and similar properties in which there are no commercial rents and which do not represent uses typical enough to warrant a market comparison method.

Many valuators and writers on valuation methods have declared that this process—the appraisal of land and building separately—is the correct process in all cases of urban evaluation. But this is manifestly incorrect as a process when applied to typical properties and especially to properties which produce real estate incomes in the form of rents, because in these cases the process does not make any allowance for the increment of value which is usually called "improved value." As will be indicated below, income-producing properties owe their values to a capitalization of income, and the income is derived from the combination of land and building. Properly improved the income is a return on a greater investment than the sum of a fair land value and a fair building value. There is an additional value derived purely from the *combination* of the land and building and not attributable to either one separately. Hence an obvious limitation upon this very much used and abused process of property evaluation.

Incidentally, the illustration used in this chapter is one which uses this process in its correct application.

Process No. 2—Comparison Process.—In this process the sale prices indicated in transfers of improved property are consulted and comparison with the property under evaluation is made. Similar sites and similar buildings are utilized and a basis for the actual comparison analysis is selected (See Chapter XII). The process is one purely of market analysis and in all valuations the appraiser would be justified in making such a study, if for no other reason than to check his results found by some other process of reasoning.

In the case of individual family dwellings the process will prove to be the preferable one, but in practically all other cases some other process can best be relied upon to produce results.

In the application of the process it is obvious that the sales prices selected and the bases of the comparison will determine the value of the method. It is also certain that the process has no application except in the evaluation of very typical pieces of real estate.

Process No. 3—Multiple of Gross Rental Process.—The process is the short-cut method very generally used during the last few years in the evaluation of apartment buildings—namely, assuming the property to be worth five, six or seven times the gross annual rental which is produced. Obviously such a device has no place in the procedure of an appraiser.

Process No. 4—Capitalization of Net Income.—In the evaluation of properties which have rental incomes the appraiser may compute the total value of the property by capitalizing the net income.

This process is correct when the property is improved to its highest and best use, managed with ordinary ability, is rented on a fair basis, and when the net income used has provided for a sufficient depreciation item to create a sinking fund large enough to replace the building after the end of its useful life. The method presupposes perpetual and constant conditions, allowing for no change in the value of the ground and making the building itself a perpetuity by accumulating adequate deductions from the gross rental for its ultimate replacement. It also assumes that there will be no rental rate fluctuation or falling off of rents in the building.

The assumption of such constant conditions into the future is not altogether unwarranted in the cases of long-life stable realty, because the assumption is really only a middle ground between two trend directions, one of which may occur, but which one the appraiser cannot always know. This process applied to relatively new buildings will lead to error inasmuch as the rentals may be higher than will persist in the building and the expenses are usually lower. The essence of the correct application of the process is in the computation or selection of the amount to use for net return (See Chapter VI). One very definite use to which the process is put is as an element in the analysis of potential future net income in the next described process.

Process No. 5—The Appraisal by Income Analysis.—This process is the general one applicable to rental income producing real estate. It is a development of the process of capitalization of net income. That process was applicable only to cases of improvement to highest and best use. This process is applicable to income property not improved to its highest and best use.

Briefly, the process consists of a computation of value in which both the present utility of the site and its potential correct utilization are analyzed. The existing net income is treated as an annuity until the end of the probable useful life of the present building. The net income which can be derived from an improvement which represents the highest and best use of the site is treated as a deferred perpetuity—a postponed capitalized value—until the time of the rebuilding of the site. The losses and expenditures involved in the removal of the present building and in the construction of the new one are treated as amounts deferred and deductable from the deferred capitalized value of the future net income.

The process of appraisal by income analysis can therefore be conceived as a quantitative analysis of the effect upon the value of a property of changes in districts and the wearing out of buildings. It is a complex process, involving careful accounting procedure, rare judgment as to the future of districts, and actuarial procedure. Its greatest weakness from the practical point of view is found in the difficulties encountered in estimating the costs of rebuilding and in adjusting the estimates of net income so as to represent the approximate average of all net incomes for a number of years.

This process forms the subject matter of Chapter VII. It is the method used to discover the stable values of all typical income-producing properties. The processes which follow are simply variations of the same appraisal procedure made to apply to peculiar cases in which ordinary commercial rents are not present.

Process No. 6—Analysis by Corresponding Typical Use.—The valuator in appraising a hotel building, downtown club, or similar structure, requires a process whereby he can appraise by analogy to typical commercial rent-producing property. The process comprises the visualizing of a typical building of similar volume, an assumption as to its net income, and a computation of total value. From this total value he deducts the value of the assumed typical building and adds the reproduction value of the existing building to secure his final result. In addition, the process requires proof that the existing building represents the highest and best utility.

It might be inferred that this process is the same as the appraisal by summation, but it is not, inasmuch as the value of the ground here included is the resultant of income analysis and does not neglect the increment of "improved ground value." The correct application of the process must, however, in every case include very definite proof that the existing use of the site is certainly not a lower use than the assumed building would have been. An illustration of this process has been included in Chapter VII.

Process No. 7—Inferential Income Process.—In many properties there are commercial rents secured from parts of the building, but not from all of it and the determination of net rent directly is not feasible. Such a case is the one in large cities where a bank may occupy the lower six floors of its own building and in which many of the revenues and expenditures are common to the real estate and the business enterprise. Employees very frequently, in such cases, receive salaries for services and functions which are partly chargeable to the conduct of the business and partly to the management of the real estate as such.

The process of appraising which is applicable is the appraisal by income analysis, the amount of the net income being secured by an assumed charge of rent to the business enterprise and a distribution of costs to show the correct amount to include deductions from gross income.

This process involves the combined services of real estate appraiser and accountant. In those cases where a separation of costs chargeable to the real estate is impracticable, normal costs in similar buildings are used by the appraiser in securing a figure for net annual return.

Process No. 8—Sales Percentage Process.—This is the process of appraising by income in which the gross income of the site is found by assuming the commercial rent which a business enterprise can pay to be the percentage of the gross sales of the business which is characteristic throughout that line of business. The correctness of the process is dependent upon the extent to which there is a typical ratio existing between rent requirements and gross sales in the business. If the ratio is very low (say 1%), the reliability of the method disappears, inasmuch as great variations in rent would no longer affect the operations of the business enterprise very greatly. If the average ratio is high (as with retail shops), the method becomes somewhat practicable (See Chapter VI.

IV. Methods Applicable to Land Through the Agency of Building Value.—Buildings are capital goods and their maximum values cannot exceed their costs of reproduction. The value of urban land, on the other hand, has no maximum except through the agency of a limitation upon the productivity of buildings in combination with land. Thus, in separating total values between land and building, the land value is invariably a residue. Appraisers need processes for the separation of total values and they use the following ones:

Process No. 1—Constant Ratio Process.—A number of valuators have declared that there is a typical average ratio existing between the value of buildings and the value of land and that while the ratios may be very different in cases of different classes of property they will not vary much within any one class. Their process in finding a land value from a total or building value would be to apply the constant ratio they believe to exist.

That the process is incorrect requires only an observation of actual real estate values. Two sites may each be improved to its highest and best use with a brand new one-story store. The two store buildings would have exactly the same values, but the total values of the two properties would be very different if one were in a better shopping district than the other. The difference in value would be purely a difference in land value and no constant ratio would exist.

Process No. 2—Comparison and Separation Process.—The total value of the property is discovered by the comparison process and the value of the building, found by any of the methods suggested, is deducted. The residue is the value of the land.

Process No. 3—Capitalization of Net Income and Separation.—The total value of the property is discovered by a capitalization of its net income in perpetuity and the value of the building, found by any of the methods suggested, is deducted. The residue is the value of the land.

Process No. 4—Appraisal by Income Analysis and Separation.—The total value of the property is discovered by the method of the appraisal by income analysis and the value of the building, found in any of the methods suggested, is deducted. The residue is the value of the land.

Two plates appear in the back of the book showing process selection.

The valuator thus selects the process which is most applicable to his problem and proceeds to make his analysis.

It might be well for the reader to turn back to the discussion of the data program and consult the illustration of the questionnaire given. If the data were such as is shown there, the valuator would probably select the summation process of computation as being the particular process best adapted. For a ground value he would use the Recent Transfer Process and for the building value estimate he would use the Reproduction Process, and secure his total value by adding the two results.

Land Valuation Procedure.—The unit street values on each of the three streets on which the property fronts is found by comparative analysis (See Chapter XII).

Each of the transfers would be studied and the values disintegrated as follows:

Transfer A—1341 Estes Ave.

Estes Ave. is a business street and frontage along this part of it is probably worth about \$600. Using the corner formula[1]:

$$\$38{,}000 = (.9)\ [(42)\ (600)\ (1.0)] + (.82)\ [(108.1)\ (A)\ (.45)]$$

Unit St. Value on Appleton = A = \$384.

Transfer B—670 Appleton St.

Crampton St. is a short street and its frontage is worth probably not over $\frac{3}{5}$ of frontage on Appleton St. Hence $C = \frac{3}{5} A$. Using corner formula:

$$\$44{,}500 = (.82)\ [(50)\ (A)\ (1.5) + (182.1)\ (3/5A)\ (.549)]$$

Unit St. Value on Appleton = A = \$402.
Unit St. Value on Crampton = 3/5A = C = \$241.

Transfer C—666-68 Appleton St.

Let the old frame house be worth one year's rent, \$1,200. Then the land will be worth \$30,800. Using formula for reflected value:

$$\$30{,}800 = (50)\ (A)\ (1.5) + (.071)\ [(50)\ (241)\ (1.5)]$$

Unit St. Value on Appleton = A = \$394.

Transfer D—662 Appleton St.

Using inside lot formula:

$$\$25{,}000 = (50)\ (A)\ (1.5)$$

Unit St. Value on Appleton = A = \$333.

Transfer E—656-58 Appleton St. & 655-57 Bolton St.

Each of the two buildings is approximately 40′ x 58′ and 40′ high. Hence their total cubic contents = 185,600.

Value of buildings @ 27c = \$50,112.
\$85,000 — 50,000 = Land Value = \$35,000.

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[1] The formulas used are described in Chapter XII.

Using the inside lot formula:

$$\$35{,}000 = (50)\ (A)\ (1.07) + (50)\ (B)\ (1.07)$$

The rents indicate relative street values. Bolton St. is worth approximately 3/5 of Appleton St. Hence $B = \frac{3}{5}A$. Solving formula:

Unit St. Value on Appleton $= A = \$409.$
Unit St. Value on Bolton $= 3/5A = B = \$246.$

Transfer F—628 Appleton St.

Using the inside lot formula:

$$\$20{,}000 = (52.4)\ (A)\ (1.0).$$

Unit St. Value on Appleton $= A = \$382.$

Transfer G—1301 Crampton St. & 661-69 Bolton St.

The two streets are of about equal unit value. Using the corner formula:

$$\$28{,}000 = (.82)\ [(50)\ (C)\ (1.39) + (164.2)\ (B)\ (.55)]$$

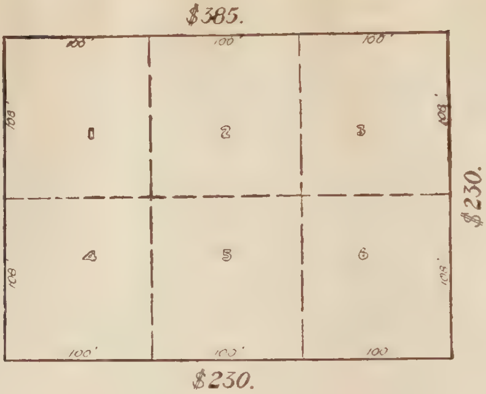
Unit St. Value on Crampton $= C = \$214.$
Unit St. Value on Bolton $= B = \$214.$

From the above analyses the unit street values indicated are as follows:

Appleton St. = $385
Bolton St. = $230
Crampton St. = $230

The appraiser then integrates a value for the lot occupied by the school by using these unit street values. He can assume the lot divided into six 100-foot lots as shown and add the values he finds for each one of them.

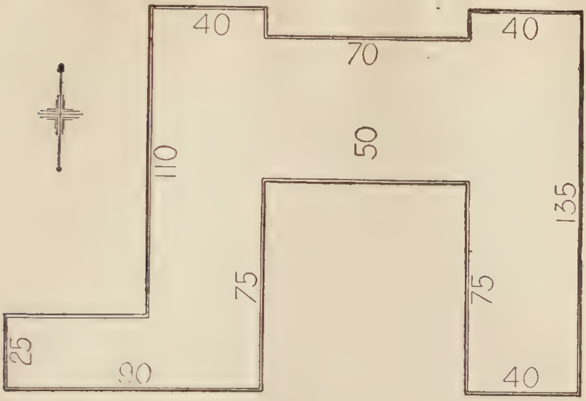
In dividing a large tract in this manner it is customary to make the divisions in parcels which are of the larger lot sizes capable of productive development in the district. In this case six lots, capable of development as apartment sites, have been selected.



Value of Lot 1 = (108.1) (385) (1.066) = $44,365
Value of Lot 2 = (108.1) (385) (1.066) = $44,365
Value of Lot 4 = (108.1) (230) (1.066) = $26,504
Value of Lot 5 = (108.1) (230) (1.066) = $26,504
Value of Lot 3 = (.82) [(108.1) (385)
(1.066) + (117.3) (230) (1.0)] = $58,502
Value of Lot 6 = (.82) [(108.1) (230)
(1.066) + (117.3) (230) (1.0)] = $43,856

Total value of the land	$244,096
Roughly	$240,000

Building Valuation Procedure.—The area of the building is 15,550 sq. ft. and its height is 55 feet, making a total cubical contents of 805,250 cubic feet. On the basis of building costs in 1912 for this class of structure its original cost must have been about 16½c. per cubic foot, or approximately $133,000. To-day this character of building costs about 40c. per cubic foot and a fair reproduction value would be $322,100. From this amount structural depreciation should be deducted. On the assumption that the physical structure has depreciated at a rate of about 1¼ per cent per annum over the thirteen years, accrued structural depreciation amounts



to $52,341. Obsolescence is not much of a factor at present. The school building has been built in accordance with fairly modern design and no higher use of the property has presented itself. Nevertheless, from the direction of development which the district is taking, the time will come eventually when the school building will be useless in the district and it is likely that such a change will occur long before structural depreciation has much impaired the utility of the building. Hence a fairly generous allowance for obsolescence might seem justifiable. There is no possible way of judging the precise degree to which the obsolescence factor will operate. There is no accrued obsolescence. Hence, as a future menace, obsolescence may be deducted as, say, one-half the amount of accrued depreciation—purely a rough guess—$26,170. Then we have:

Structural depreciation	$52,341
Obsolescence	26,170
Total..................................	$78,511

The present value of the building to the present owners is found:

Reproduction cost	$ 322,100
Total depreciation and obsolescence	78,511
Building valuation	$243,589
Roughly	240,000

Total Valuation Procedure.—

Land value by comparison	$240,000
Building value by reproduction cost	240,000
Total valuation	$480,000

This total valuation represents the present value of the property to the school as owners. The land value is a genuine fair cash market value which could be realized by a sale of the property. The building value is not a fair cash market value because a purchaser would probably not care to buy it and use it for the purpose for which it was built.

The valuator is then ready to plan and draft a report arraying the essentials of value before the client.

THE REPORT PROGRAM

The controlling factor in the drafting of an appraisal report is the purpose to which the client will put the report (if the valuator knows it). As indicated in Chapter I, there are many purposes for which valuations are made. The method of arriving at the value will be the same in each case, but the report may best be varied to fit the use to which the valuation is to be put to serve its function.

The different forms in which appraisal reports may be made really differ in only two respects: First, they differ in the amount and kinds of information deliberately *left out*. Second, they may differ in their specific form when used for some legal purpose. In the first case the complete report would comprise all the data and information secured by the data program, written up so as to be easily intelligible to the client. It would also include a complete analysis showing the assumptions made and the detailed computation of the data into the value estimate and would end by giving the conclusion and reasons for the conclusion at which the valuator has arrived in respect to the fair cash market value of the site. Such a complete report is rarely necessary and rarely serves the client.

Usually the salient and important evidences of value, the essential steps in the value computation, and a statement bearing on the best future use of the site is sufficient. However, any reduction in the extent of the report should not be a matter for the valuator to determine. If the client desires the complete report, it is that and nothing less to which he is entitled. In every case it should be the client who asks for omissions and brevity. The minimum form of report seems to be the rule to-day. Real estate board valuation committees and most appraisers give the client a simple certificate containing little more than the value figure on it. There is no particular reason why a Realtor should substitute a statement of his experience and qualifications (as many do) for the information which might be of so much value to the client. Such practice also tends toward hastily and poorly made appraisals, inasmuch as the man with a record which should qualify him as an appraiser is obviously in a position where he is exempt from the necessity of displaying his methods of procedure.

The other considerations affecting the form of the valuation report is the legal use to which some reports are put. Some government departments provide regular forms for use. Sometimes attorneys may ask that a bare certificate of value be supplied and that the complete report be sent as a corroborative codicil to the certificate. In any event, the appraiser can always report to his client in the form the client prefers, although he cannot always report the value estimate the client wishes.

Having completed the report and having delivered it, the valuator should file away all of the data he has gathered and hold it not only to assist him in future appraisals but as a service to the client who may desire further data which were secured but were not reported to him at the time of delivery.

The following example of an appraisal report should not be considered as standard practice in any sense. The report of the valuation of the Sunset Crest Girls' Academy is included here for the purpose of indicating the completeness which such reports should exhibit.

APPRAISAL REPORT

To: The Board of Trustees,
Sunset Crest Girls' Academy,
Appleton, Iowa.

We have been requested by Mr. C. A. Gordon, Secretary and Business Manager of the Sunset Crest Girls' Academy, to examine the premises owned by the school corporation for the purpose of determining their value to the school and likewise the fair cash market value of the property if offered for sale. We submit below our report as of April 1, 1924.

Legal Description.—Original Lots 1, 2 and 3, in Block 12, in Bolton's Subdivision of the SW¼ of the N½ of the E½ of Section 4, Township 42, Range 15 East of the Third Principal Meridian, known as Nos. 700-746 Appleton Street W. in Appleton, Iowa.

Physical Description.—The site is rectangular, and has a frontage of 300 feet on Appleton Street, 300 feet on Bolton Street, and an east frontage on Crampton Avenue of 216 feet, comprising a total of 64,800 square feet. There is an alley 20 feet in width on the west.

The property is improved with a three-story and English basement brick building with stone trimmings, fireproof construction, heated by steam, and with ample facilities for the purpose for which it is used.

Valuation.—We find the value of the property to the school to be $480,000, which is distributed as follows: Land, $240,000; building (value to the school), $240,000.

The fair cash market value of the property is $360,000.

We, the undersigned, after a careful study of the elements entering into and forming the value of the property described above, do hereby certify that to the best of our knowledge and belief the values as stated in this appraisal report are correct.

R. P. James & Son.
By:
(Signed) R. P. James.

Appleton, Iowa,
April 1, 1924.

Descriptive and Corroborative Data

In arriving at a value of the land we have considered the following factors which affect our decisions:

1. The Site.
2. The Vicinity.
3. The Market.
4. Sales.

1. *The Site.*—The property is well located not only for its present use but for a permanent maintenance of value. It is three blocks from the business part of the city and one-half block from Estes Avenue, a through arterial boulevard rapidly taking on a retail character. It is one block from Doane Avenue, which is beginning to show signs of retail development, although the street has no promise of rivaling Estes Avenue in this respect. The indications are that in the future if an east and west retail street develops, it will be Appleton Street, as it is now more of a thoroughfare than any other east and west street and is a proper distance from the retail center of the city. Further, the surface line development will naturally be along Appleton Street, inasmuch as it is a through street and in direct line

with other towns to the east and west. The electric line at present turns south at Ralston Street to pass through the business center. It would be a logical development for this line to continue straight west as a direct line to Netswick and beyond. North and west of this location is found the best residential part of the city. For these reasons we are of the opinion that values will remain stable.

2. *The Vicinity.*—The present occupancy of the street is residential. Apartments are taking the place of the old residences. The old improvements are of various types, ranging from old frames to substantial mansions, but none of them can be considered as adding to frontage values as obsolescence brought about by the changing character of the district has set in. The apartments are new or nearly so and attract the class of tenants now occupying the remaining residences.

There are two churches, the new M. E. Church now approaching completion on Crampton Street, one block north of Appleton Street, on the south border of the residential district, and the Baptist Chapel at 631 Appleton Street.

Estes Avenue is being widened to 84 feet. Eighteen feet is being taken from the west side of the street. This improvement is progressing rapidly and the widening will be completed about June 1, 1924.

The erection of the new bridge on Estes Avenue, ten blocks north, will add materially to the development and importance of this street and therefore must affect adjacent property favorably.

3. *The Market.*—The tendency of the market has been upward and sales have been increasing in number. There is much inquiry for property in the locality and interest is especially directed toward Appleton Street. The type of buyers appears to be equally divided between speculators and investors. There are no signs, however, of a "boom" market as prospective future rentals warrant the prices paid.

4. *Sales.*—Real estate transfers have been reasonably numerous in the last year for the limited district under consideration. We have noted the following:

1341 Estes Ave., 8/21/23—40 x 100 Old improvements of no value	$38,000
670 Appleton St., 6/6/23—50 x 166 Vacant	44,500
666-8 Appleton St., 5/4/23—50 x 166 Old frame residence, doubtful value	32,000
662 Appleton St., 10/10/23—50 x 166 Vacant (under market)	25,000
656-58 Appleton St. 655-57 Bolton St., 9/19/23—50 x 216 Improved with two 6-flat buildings recently erected. Rents north building $7,200; south building $4,500... (Considered a high price. No definite information obtainable. May have been a padded consideration.)	85,000
628 Appleton St., 10/11/23—52 x 100 Vacant—now improved by apartments	20,000
1301 Crampton St., N.E. corner Bolton St., 7/7/23—50 x 150. Old frames	28,000

The unit values of the street frontages bounding the property described are deduced from a comparative analysis of the above transfers, with due reference to the surroundings and nearness to the site appraised, and have been found to be approximately as follows:

Appleton St. frontage	$385 per front foot
Bolton St. frontage	230 per front foot
Crampton Ave. frontage	230 per front foot

for lots 100 feet deep.

From these unit front foot values we have determined upon the land value of $240,000, making allowance for depth, corner influence, and exceptional total area.

It should be noted that the value of the land as given is a conservative fair cash market value of the ground alone.

The building is symmetrical except for the one-story office wing at the southwest corner. It is three stories in height, with English basement, fireproof, strictly modern in its appointments and adaptable to the use to which it is put. It contains, in addition to comfortable, well lighted and ventilated dormitories with ample toilet facilities, assembly hall, classrooms, library, laboratories, music-room and gymnasium, and swimming tank. The domestic arrangements are thoroughly modern. The entire premises are in good repair and show no signs of neglect in either house or grounds.

The building was built in 1912 at a cost of approximately $133,000, which did not include the wall and iron grill which was erected at a later date from funds furnished by a patron. The value of this wall and grill are not included in our report. The building covers an area of 15,550 square feet and its cubic contents are estimated at 805,250 cubic feet. We consider its reproduction value to-day at 40c. per cubic foot, or $322,100. Depreciation is estimated at 1¼% per annum for 13 years, or $52,341. Obsolescence should be considered only in reference to the changing conditions of the district and the growth of the city, which may bring about another use for the property so profitable as to warrant its sale and the removal of the school to another locality. This time is not yet in sight but the obsolescence feature must not be overlooked. Therefore we allow one-half of the depreciation charge ample. We have the following:

Reproduction cost		$322,100
Depreciation	$52,341	
Obsolescence	26,170	78,511
Present value of the building		$243,589
Or in round numbers		240,000
Which with land value		240,000
Produces a total of		$480,000

which we submit as the value of the entire property to the Board of Trustees of the Sunset Crest Girls' Academy.

Sales Value.—It is evident that if the property is offered for sale a price of $480,000 would be difficult to secure due to the fact that the building must either be removed to make way for other improvement or extensively remodeled.

It could be made adaptable for either hotel or apartment purposes at, however, considerable expense. A buyer would probably only consider its purchase with either one or the other of these disposals in view. As the tendency of ground values is upward, it is our opinion that the property could be sold for the ground value given above, viz: $240,000, plus one-half the sound value of the building, or $120,000, making a fair cash market value of $360,000. Our investigations warrant a cost of from $100,000 to $125,000 to change the building to an apartment building or an apartment hotel. Hence our conclusion.

Taxes.—The general tax levy for 1923, payable in 1924, was $7,825.31.

There are two installments of special assessments for the widening of Estes Avenue due, one in 1924 and one in 1925 of $198.25 each, bearing 5% interest from date, making a total of $396.50.

Incumbrances.—There is a balance remaining of an original mortgage indebtedness of $28,500, due in 1929, bearing 6½% interest per annum.

Insurance.—The building is insured for 80% of its full value as estimated by the agency which placed the line, $178,000. General liability insurance is carried also.

R. P. James & Son.
By:
(Signed) R. P. James.

A detailed description of the preferred computation processes is found in the succeeding chapters described under various classes of property to which the processes are usually most applicable. It is well to note, however, that the processes and classes of property do not go together. The principles and processes are general systems which might apply to any classification of real estate. The classifications of real estate used are simply the general arbitrary classifications generally found to form the basis of specialization among real estate men.

CHAPTER V

INCOME AS EVIDENCE OF VALUE

The income produced by rented properties is the measure of their values. Purchasers of income-producing property are usually actuated by the investment motive, and the amounts which they are willing to pay for properties are functions of the income. Therefore the processes of appraising in which income analysis is involved are used for most kinds of business property which is rentable to tenants.

By business property is meant property which is used for stores, offices, wholesale merchandising, banks, clubs, hotels, theaters, and, to some extent, light manufacturing. From the valuator's viewpoint, such property is characterized by higher values than any other form of real estate, by comparatively intense use, and by the presence of pedestrians. Furthermore, such properties are most frequently used by individuals and business firms other than the owners and there are tenants who pay rentals for their locations. Thus these properties can usually be appraised with some reference to their rental income-producing capacity, and from this viewpoint the valuation of such properties is possible with greater correctness than is so in the cases of industrial, residential, or farm property. The tangible rental income provides a point of departure in the valuation analysis.

Income is the basis of the appraised value. The appraisal procedure which will be described will be comprised of the following processes:

Capitalization of net income.
Appraisal by income analysis.
Analysis by corresponding typical use.
Inferential income process.

The procedure is applicable to all real estate which produces tangible rentals from tenants. Thus the method not only applies strictly to business property but is capable of application to rented residential property, notably to apartments. When appraisal by income analysis is at all expedient, it is usually the preferred appraisal procedure.

The economic construction of real estate values in general has been indicated. It has been shown that the long-time value of real estate is determined by utility and that income or rents secured from various competing utilities provide tangible means for ascertaining correct long-time values.

The General Case.—All real estate can be assumed to be in a state of value fluctuation. The utility which constitutes the highest and best use at one period may cease and be supplanted by some other utility. We may say, then, that every piece of real estate has a present use and a different potential use which will eventually represent its highest utility. Of course vacant ground has only the potential utility, and ground which is improved with a structure which represents the highest and best use has a different potential utility infinitely deferred.

Each possible utility will indicate a rental income corresponding to the intensity of the use. Thus it is possible to visualize a property as it would be or as it is with various utilities, and by a knowledge of the rentals obtainable from various utilities to determine what income each of them would produce.

If we know exactly when to remove the present improvements and to replace them with others we can find the present value of the property as indicated by the income which it will produce. It will obviously be the value of the new utility and the value remaining in the old utility, less the cost incurred by making the change, each of these elements corrected for the times at which they operate. The inter-relationships between all of the various elements which would be introduced in such an analysis are always the same.

Thus there is a general case which describes the valuation procedure applicable to any income-producing property. In principle the same procedure is applicable to all properties, ranging from improved property now utilized to its highest and best use, to vacant ground which is not yet ripe for improvement for commercial use but will be. There are thus three cases: (1) Property improved to its highest and best use; (2) improved property which is not at its highest and best use, and (3) vacant ground capable or some day capable of commercial development. Each of these cases is the same in principle, the first and last simply representing the extreme cases of the general one—namely, improved property not at its highest and best use.

Procedure When Property Is Improved to Highest and Best Use.—The accompanying diagrams (Figs. 5 and 6) represent the procedure when the property is improved to its highest and best use. The line R (Fig. 5) indicates the gross income level which the property is assumed to produce each year indefinitely into the future. As will be indicated in Chapter VI this level is not neces-

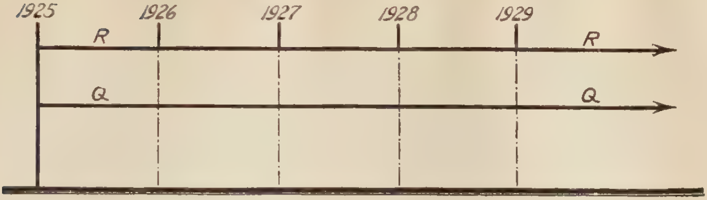


FIGURE 5: VALUATION OF PROPERTY IMPROVED TO HIGHEST AND BEST USE
R represents gross income level
Q represents level of annual outlays

sarily the actual gross income which the property now produces but is the leveled or typical yearly gross rental which will be characteristic of the gross rentals in the future. The line Q is the average yearly outlays required to cover operating expenses, taxes, and depreciation. It is also leveled and assumed to be constant for all time. The presence of the depreciation item is the principal justification for the assumption of perpetual gross income and perpetual constant deductions, inasmuch as the depreciation items are assumed to accumulate and replace the structure periodically.

Thus, when a property is improved to its highest and best use the net income may be represented by the difference in the levels of the gross income (the R line) and the gross deductions (the Q line), and Fig. 6 indicates the net income of such property. The shaded portion is the net income, shown as a level annual amount, the worth of which to-day may be found by capitalization.

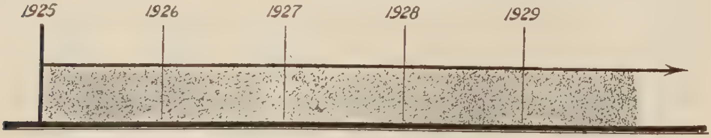


FIGURE 6: VALUATION OF PROPERTY IMPROVED TO HIGHEST AND BEST USE
Shaded Portion is difference in level between R and Q in Figure 5 and represents net income.

Thus, to find the value of a property improved to its highest and best use the process of capitalization of net income is used, and the net income is found by deducting from the leveled gross income, all operating expenses, taxes, and depreciation. That is, the appraiser finds the value of the shaded portion in Fig. 6 as of to-day.

Procedure When Property Is Vacant.—Figures 7, 8, and 9 represent the case of vacant ground which may be developed by an income-producing utility. The R line in Fig. 7 represents the gross income. In order to secure an income the property is assumed to be improved to its highest and best use. Then an income appears, rises as the building is rented and reaches its typical yearly level as in the case outlined above. The Q lines represents the outlays made in carrying and utilizing the property. At present the level of the Q line is at the point which represents the yearly tax bills.

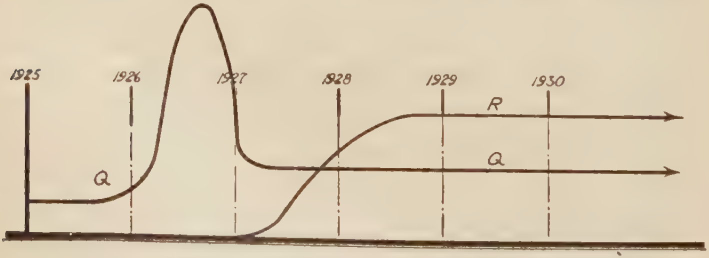


FIGURE 7: VALUATION OF VACANT PROPERTY
R represents gross income level
Q represents level of annual outlays

It continues at this level until the construction of the building commences, at which point it rises abruptly, representing the outlays made in the building of the structure. The cost of construction, the taxes, loss of interest on capital used during construction and all

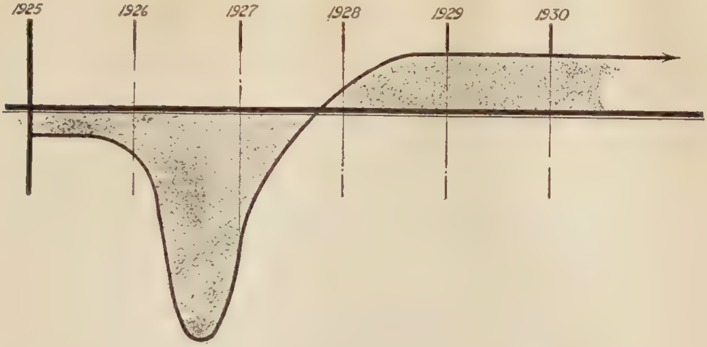


FIGURE 8: VALUATION OF VACANT PROPERTY
Shaded portion is difference in level between R and Q in Figure 7 and represents net income.

other outlays are included. After the building is completed the Q line recedes to the level position assumed to represent the average yearly outlays in the form of operating expenses, taxes, and depreciation, and persists indefinitely into the future at the same level.

In analyzing the net income in this case (Fig. 8) the amount of the net income is variable. The cost of carrying the property up to the time of the construction of the building, and the actual outlays involved in the construction of the building are illustrated as being below the zero line. The net income while the building is becoming a going concern and thereafter is shown as an area above the zero line. A purchaser of the ground buys the negative and positive amounts shown by the shaded areas, and the value of the property is going to be determined by the extent of the areas and the time from the present at which they occur.

In appraising vacant property capable of a development of this kind it is obvious then that the principal assumptions will be: (1) The length of time which will probably elapse between the present and the date of constructing an improvement. (2) The selection of the character of improvement which will represent the highest and best use of the property. (3) The determination of the amount of the outlays necessary to construct the improvement. (4) The assumed gross income which will be produced. And (5) the total annual deductions in the form of operating expenses, taxes, and depreciation which will be incurred in the operation of

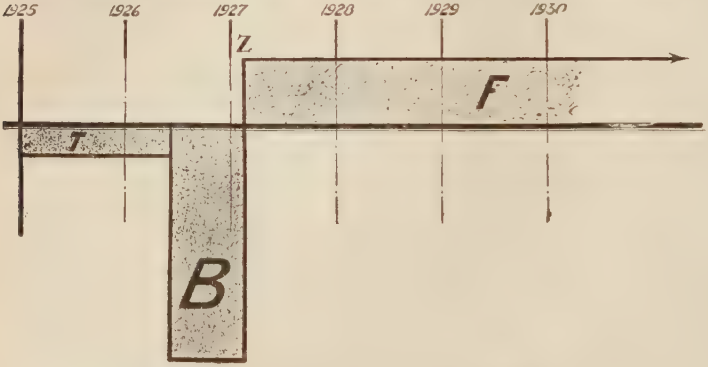


FIGURE 9: VALUATION OF VACANT PROPERTY
The shaded portions of Figure 8 are converted into rectangles.

the new building. In actual practice the variable areas would be treated as rectangles, as shown in Fig. 9, area T representing the tax outlays up to the time of construction, area B representing all of the outlays made to construct the building, and area F representing the net income in perpetuity after the building is a going concern. The effect of each of these areas in the value is found as of the present date. Thus, area T, which is the cost of carrying the property until improved, is treated as an annuity over the period, its present value as an annuity found, and then deducted. The area B which is the total of the direct and indirect costs of building construction is computed, reduced because it is deferred, and then deducted. Area F, which is the future net income of the property, is treated as a perpetuity; that is, its value as of the date Z is found by direct capitalization, then reduced because it is deferred, and added.

Whatever amount is left when the cost of carrying the property and the cost of the building, that is, areas T and B, are deducted from the present value of the future net income, that is, area F, is the present value of the site. It will be obvious to the reader that this is not different in principle from the method shown above for property improved to its highest and best use. The effective net income is the basis of the value of the vacant site and is the true measure of the amount which a purchaser should pay. The results secured are stable values, which are in every case subject to adjustment to the market.

The above two cases are the limiting or extreme cases between which the general case exists—namely, the case of income-producing real estate which is not improved to its highest and best use.

Procedure When Property Is Not Improved to Highest and Best Use.—Figures 10, 11, and 12 represent the general case. The R line is the gross income trend. The Q line is the gross outlay trend. Inasmuch as the property is not improved to its highest and best use, it is assumed that after a period, short or long, as the case may be, the present structure will be removed and a new building immediately constructed, which building will represent the highest and best improvement of the site. Thus the R line indicates a present gross rental level which falls as the tenants vacate before the new construction, and becomes zero during construction. It then

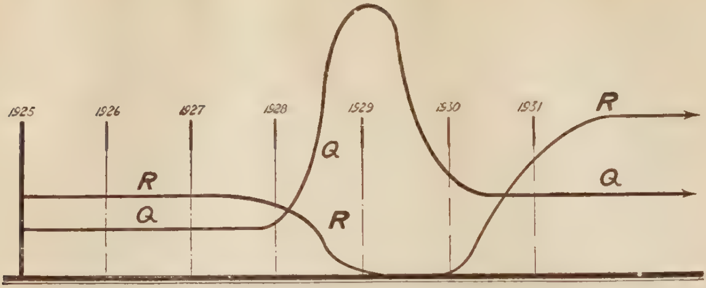


Figure 10: Valuation of Property Not Improved to Highest and Best Use

R represents gross income level
Q represents level of annual outlays

rises as the new building becomes a going concern, until it reaches the typical level which it will maintain. The Q line commences at the level representing all of the present annual outlays or deductions from gross income, rises abruptly to represent the cost involved in building the new building and recedes again to the permanent level which it will have after correct improvement has taken place.

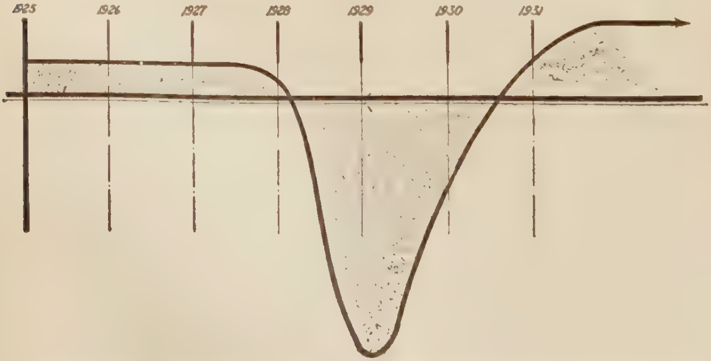


Figure 11: Valuation of Property Not Improved to Highest and Best Use

Shaded portion is difference in level between R and Q in Figure 10 and represents net income.

Figure 11 represents the effective amounts involved in the evaluation of the property, the positive amounts appearing above the zero line and the negative amounts below. These shaded portions are simply the difference in level between the R and Q line in Fig. 10, and a purchaser of the property buys the negative and positive amounts shown. The value of the property will be determined by the extent of the areas and the time from the present at which they occur.

In appraising an income-producing property it is obvious then that the appraiser will make the following assumptions: (1) The remaining useful life of the present improvement, or the length of time which should elapse before placing a new utility on the site, (2) the extent of the present net income, (3) the selection of the character of improvement which will represent the highest and best use of the property, (4) the determination of the actual costs involved in changing utility,

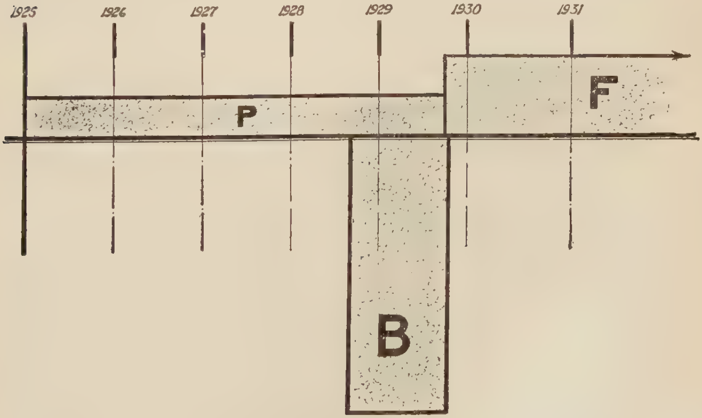


FIGURE 12: VALUATION OF PROPERTY NOT IMPROVED TO HIGHEST AND BEST USE

The shaded portions of Figure 11 are converted into rectangles.

(5) the assumed gross rental which will be produced, and (6) the total annual deductions in the form of operating expenses, taxes, and depreciation which will be incurred in the operation of the new utility.

In actual practice certain of these steps are sometimes left out. The areas are treated as rectangles, as shown in Fig. 12. Area P and area F are respectively the present and future net incomes.

The present net income is assumed to continue until the time of rebuilding and the future net income is assumed to commence immediately. To justify this, the loss of rentals in the old building and the rental income lost while the new building is becoming a going concern are treated as lump sums and added to the cost of constructing the new building. That is, they are made indirect costs of changing the utility. Area P, representing the present net income, is treated as an annuity; its present value is found, and becomes a positive item in the value estimate. Area F, representing the future net income, is treated as a perpetuity, its value as of the date of rebuilding being found by direct capitalization, then reduced because it is an amount deferred, and becomes a positive item in the value estimate. Area B, which represents the costs involved in changing utility, includes the direct cost of removing the old building, the cost of constructing the new building, and all other outlays or losses incurred by the change of improvement, such as loss in rentals, tag-end vacancies, interest losses, etc. This amount, area B, when it is found, is reduced because the amount is an item deferred, and is then deducted from the present values of areas P and F, the result being the true value of the property.

This is, then, the concept of evaluation as it is applied to the general case. The process of capitalization of net income is used where income-producing property is improved to its highest and best use. In all other cases of income-producing property the process of appraisal by income analysis as conceived in the general case above is applied. The appraisal by corresponding typical use, and the inferential income process are devices by means of which the general income method may be applied to particular cases of high value property (See Chapter IV).

The practical application of these income processes, once the basic concepts described above have been mastered, is entirely dependent upon the finding of the correct quantities for cost of rebuilding, for present and future net rental income, etc.; and, once the correct quantities have been determined upon, the relationship between the quantities will always be the same. Therefore, the next chapter will deal with the computation of net income, and the succeeding one with a continuation of the general principles involved in the appraisal of income property.

CHAPTER VI

THE COMPUTATION OF NET INCOME

Net income is defined as the amount remaining each year after all deductions and outlays, including the operating expenses, taxes, depreciation, etc., have been deducted from the gross rental income of the property.

Gross Income

We have now developed the principles which govern the appraisal of income-producing property (Chapter V). Two of the important factors were the present and future gross incomes, respectively. It now becomes important to inquire into the characteristics of these items.

By the gross income of a property is meant the sum of money which is collected annually from the operations of the property. This income is collected in the form of commercial rents paid by tenants. If the owner uses the property himself, it is assumed that he pays himself the rent in an amount equal to the amount he would receive were he to let his property to renters. There are other sources of income from some properties, such as the sale of power, special services by the management, etc., but these are unimportant in our analysis. For us gross income is comprised of the total annual rents paid by tenants.

The amount of rent which a tenant pays is controlled by market forces. The ability of his business enterprise in competition with other business enterprises to pay rent will determine the amount of the rent. If he sells goods, the prices which he gets for his goods and the quantities in which he is able to sell them on the particular site will determine his ability to pay rent, and will fix the amount of the rent. It is a common fallacy to assume that the prices of commodities depend in part upon the level of rents. In reality, the rent level depends in great measure upon commodity prices.

Thus the relative rental values of properties are dependent upon their relative importance in production and distribution, and their relative importance is measured by the rents which competing enterprises can pay.

Given a knowledge of the rental market, it is possible to estimate the gross rental procurable from a site by multiplying the rentable area by the unit rates and making corrections for normal vacancies, future rental market fluctuations, and the persistence of rental levels over a reasonably long period as the improvements depreciate structurally.

The rates per unit of space as they are used by rental agents and appraisers are usually in terms of price per year per square foot in the case of offices, bank floors, upstairs shops, shallow stores, wholesale spaces and lofts, warehouses, etc. Store space, particularly high valued store space, is now very commonly rented on the basis of a unit rate per year per front foot. In the cases of apartment buildings a rental rate is customarily expressed in terms of the rent per month per room. Whatever the class of space or unit used, an office specializing in valuations will maintain data indicating the going unit rates for typical space and will attempt to create such records over a long period of time. Particular attention will be given to the differences in the unit rates resulting from the condition and age of the building.

A direct multiplication of the area of rentable space by the going market rate gives an erroneous figure in most cases for gross income, inasmuch as it would assume the existing rental market to represent the average of all rental markets for many years, and because it assumes that the building always be fully rented, that there will be no collection losses, and because it assumes that the space will continue to be just as desirable after the building becomes older. These corrections and adjustments are therefore made by applying the past trends and experiences of real estate to the future.

The first adjustment of this character which the appraiser makes is to attempt to level the full rental over a reasonably long period into the future. There are three steps taken to accomplish the leveling: First, the rental market has a trend. Over a great number of years the general rental level changes. It may rise and fall with considerable violence in rapidly growing cities or under unusual business conditions (like the War), but such rapid fluctuations usually move about a general trend which in the United States has been gradually upward. Such gradual upward trend can be assumed to persist in the future at a very similar rate of rise. Such a curve is probably very similar to the gradual trends in general commodity prices. The rental rates for space can be plotted on a curve for each class of space and a smooth line through the fluctuating curve will average it sufficiently to show the direction and rate of rise or fall in the trend. If present rental rates are far from this line they would not be used. The trend line would be the one to accept as representing the typical unit rates in the future.

The second step attempts to correct the trend line for the change in unit rates which may take place as

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Appraised by Capitalization of Net Income

the building becomes older and depreciates structurally. In some classes of property the rental rates do not seem to change greatly with structural depreciation. For example, the very old office buildings in the central districts of the cities seem able to obtain the same rents per square foot of space as the newer ones and over long periods until the buildings are very obviously deteriorated the rental rates are unaffected. In the case of store space no apparent adjustment seems necessary. Rental rates are not much affected by the age of the structure until after extreme depreciation has occurred. The same is equally or more true in the cases of old hotels. Depreciation does not seem to affect their rental value until after a very great amount of observable deterioration has set in. Thus for these kinds of commercial properties it is usually proper to assume no fall whatsoever in rental rates to result from aging of the building. On the other hand, age does affect the rental rates in light manufacturing buildings and lofts. As the buildings become older the square foot rental rate falls off. In apartment buildings structural depreciation and the obsolescence in fixtures always results in a falling in rental rates throughout the life of the structure. Thus in these kinds of properties the appraiser estimates what a fair rate of fall would be, securing his data on the basis of the differences in rents obtainable in old and new buildings which are located similarly. This rate of fall which is projected into the future is then subtracted from the rental rate trend curve, and the resulting line will represent the expected rental rates from year to year in the actual building which is being valued. This was the second step.

The third step is the leveling computation. The rental rate trend curve is computed into an equivalent level line, and the height of the line will be the rental rate level which the appraiser uses in his subsequent analysis. The leveling computation need not be very complicated. Usually all that is necessary is to draw a level line which seems to average the levels of the curve, giving much greater weight to the earlier parts of it than to the expected levels which are considerably deferred.

An example to illustrate these three steps follows:

First Step.—Records show that the rental rates per month per room in typical apartments in the district to be—

1910 —	$11.51	1917 —	$13.04
1911 —	11.51	1918 —	14.07
1912 —	12.90	1919 —	15.16
1913 —	12.65	1920 —	17.72
1914 —	13,09	1921 —	19.86
1915 —	13.17	1922 —	20.56
1916 —	13.32	1923 —	21.00

(Data from trend indicated in report of Special Commission on the Necessaries of Life, State of Mass.)

The above data are then plotted in the form of an historigram, and a straight line indicating the typical long-time trend of rents drawn through the curve, as in Fig. 13.

The straight line indicates that rental rates for this class of property have increased since 1910 at a rate of about 68½c. per room per month per year.

Second Step.—The straight line indicating the trend of rental rates is then projected into the future.

If it is found that in general rental rates have diminished at a rate of about 80c. per room per month per year due to structural depreciation, the straight line indicating this latter trend is subtracted from the line indicating the rise in rental rates, as in Fig. 14.

Third Step.—Then take, say, the resulting level at each five-year point, and average them, giving greater

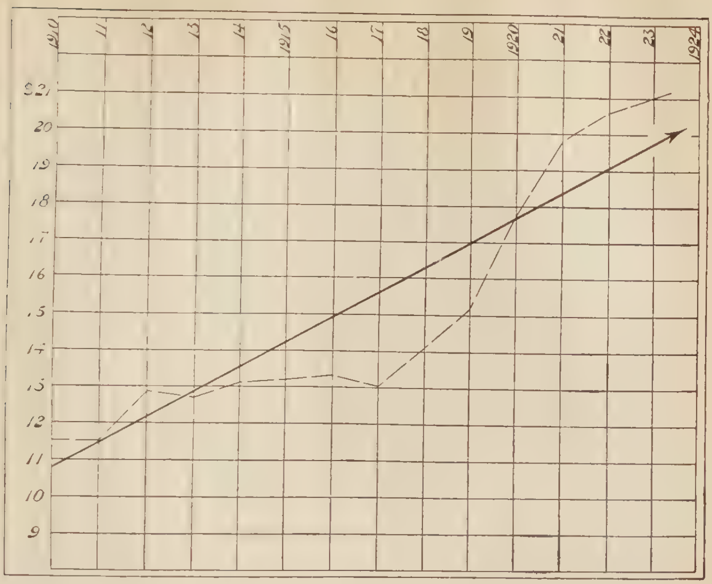

FIGURE 13: THE TREND OF RENTS

weight to the earlier ones. For example, weight them 4, 3, 2, and 1. (Or in some problems they might be weighted 7, 5, 3, and 1.)

Then:

$$\begin{array}{r} 4 \times 19.75 = 79.00 \\ 3 \times 19.18 = 57.54 \\ 2 \times 18.60 = 37.20 \\ 1 \times 18.03 = 18.03 \\ \hline 10 \qquad\qquad 191.77 \end{array}$$

and 191.77 ÷ 10 = 19.18, which is the average equivalent rental rate level. This figure the appraiser uses in his subsequent analysis.

Obviously some knowledge of future rent levels is

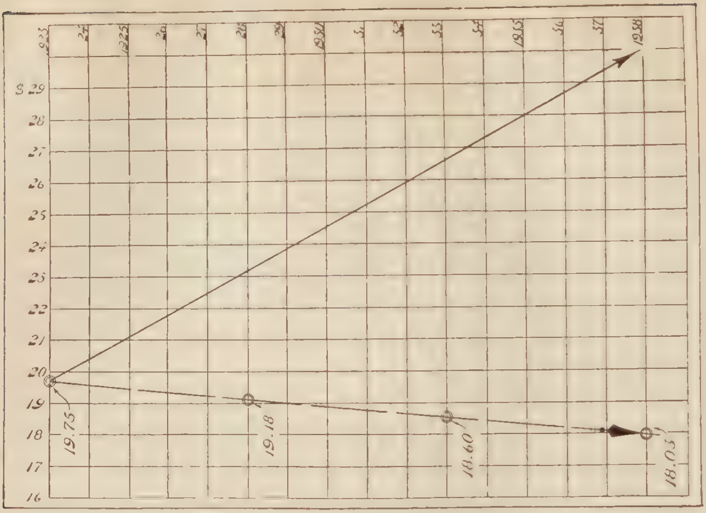

Figure 14: Rental Trend Projected and Fall in Rents Subtracted

indicated by the existing leases in a building, particularly if they have long terms.

The second adjustment necessary is to reduce the equivalent level rental income secured by multiplying area and rental rates in order to make an allowance for normal vacancies and collection losses. Other rent loss contingencies are usually included in this reduction estimate. The reduction is most easily made by applying a flat percentage for vacancies and other rental contingencies. The actual per cent of reduction must be selected in view of past experience in the city and there should be considerable variation in such percentages under different conditions. Building managers and building managers' associations are usually in an excellent situation to advise the appraiser in this respect. Very frequently applied rates are the following:

First-class office buildings	4 to 6%
Downtown stores	0 to 3%
Outlying stores	3 to 5%
Apartments	5 to 10%
Light manufacturing buildings and lofts	8 to 11%

The percentages above are not very significant, inasmuch as the amount of building in a community compared with the real estate demands will very much determine the percentage.

A very common practice among appraisers in the handling of these adjustments is to apply a percentage of reduction to the full rental, including in the selection of the percentage all possible rental losses—vacancies, rental market fluctuations, collection losses, etc. Such a practice is certainly correct and would probably be used in preference to the more complex analysis suggested above, except in such cases as those involving very high value property and where experience data are available.

To most business men the rents which they are paying for the use of sites represent expense items in their businesses. The proportion of total expense of their business operations which can be paid as rent depends absolutely upon the relative importance of location in the conduct of their businesses. To the retail merchant location is secondary only to the actual possession of a stock of merchandise to sell. Hence, the percentage which his rent bears to his total expenses is much greater than the like percentage in a tanning plant's books, because the tanning firm can tan hides anywhere along a water route with equal facility and location is of less importance than other elements in this business. And of course, the merchant can pay greater commercial rents in order to secure the all-important location.

Thus the rental level depends upon the competitive bidding of various businesses for sites, and the importance of the sites in the conduct of the businesses is the essential factor in the competition. The character and volume of business is the determinant of the actual rent paid in the long run.

By analyzing the statements of firms in various lines of business we are enabled by average statistics to make some estimates of the percentages of total sales which are paid out as rent for location.

Such analyses have been made in a few retail lines. It is to be hoped that a continued compilation of experience statistics in these and other lines will produce more extensive and adequate data for valuators in the future. Reliable data of this character will be of increasing importance to appraisers in the future.

The Bureau of Business Research, Northwestern University, has made a very exhaustive study of retail men's clothing stores, and particular attention was given to the relation of commercial rent to total sales and expense. It was shown that from year to year the amounts of rent paid increased as follows:

RETAIL CLOTHING STORES

Size of City in ,000's—	No. of Stores	*Percent increases in rent:* 1916 to 1917	1916 to 1918	1916 to 1919	1916 to 1920
Average	181	11.6	21.5	32.0	41.9
Under 10	52	5.8	6.5	13.0	30.7
10 to 20.........	29	5.7	19.4	23.7	47.2
20 to 40.........	27	4.3	9.3	23.0	29.2
40 to 120........	37	9.1	16.7	26.1	40.8
120 and over.....	36	14.8	26.8	38.4	44.6

It was observed that, in general, rent constituted, in each successive year, a smaller proportion of sales and that commercial rentals, while undoubtedly increasing as stores increase in size, actually decrease when expressed in the amounts of sales secured.

In 981 retail men's clothing stores the following percentages of rent to total sales obtained:

RETAIL CLOTHING STORES

Size of City	*Percent rent to total sales*
Under 10,000	1.8%
10,000 to 20,000	2.2%
20,000 to 40,000	2.5%
40,000 to 120,000	3.4%
120,000 to 200,000	3.5%
200,000 and over	2.8%

The typical percentage was 2.64%, which is a considerably lower ratio than many have believed to exist.

The same institution has commenced to collect data relating to the operating expenses in retail meat markets. Recent figures covering meat markets in several cities indicate the following:

RETAIL MEAT MARKETS

City	*Percent rent to sales*
Chicago	2.1%
Cleveland	2.5%
New York City	2.7%
Two small cities	1.3%

These ratios were secured from data concerning operating expenses in 61 typical stores. In each instance wages were about six times as great as rent.

The Bureau of Business Research, Harvard University, has investigated operating expenses in a number of retail and wholesale lines. It is from these studies that most of the data which follow have been taken.

Two hundred ninety-one retail drug stores were studied in 1919, but the figures are based principally on one hundred eighty-seven. It was found that rent constituted from 0.8% to 11% of total net sales and a common figure was 2.8% of net sales. In a substantial number of retail drug stores the expense for rent was less than 2% of net sales, but an even larger number spent more than 3%. A comparison was made between expense for rent in small cities and towns with rent expense in large cities. This indicated that rent expense generally was about 1% less for the druggists in the small cities and towns. While the common figure for rent in drug stores in towns and cities with less than 10,000 population was 2.2%, a substantial majority of those in larger cities paid over 3%. The rent expense generally tended to be highest in cities with over 50,000 population. In many of the stores in the large cities the high expense for rent was offset by a rapid rate of stock-turn which reduced interest expense. The common figure of 2.8% has undoubtedly advanced somewhat since 1919.

Harvard University published during the summer of 1923 a most searching investigation of operating expenses in 421 retail shoe stores in 1922. The typical figure for rent for all firms reporting was 3.3% or $1,650, on the average, for a representative firm with sales of $50,000. Many have believed this figure too low, but of the 421 stores reporting for 1922, only 59 had rent amounting to 6% or more of their net sales, and only 39 reported figures from 5 to 9%. On the other hand 157 had rent percentages less than 2.6%. These rent figures in all cases included charges for buildings owned as well as leased.

RETAIL SHOE STORES

Size of City	*Number of stores*	*Percent rent to net sales*
Less than 50,000	266	2.6%
50,000 — 99,000	42	3.6%
100,000 — 499,000	59	4.1%
500,000 and over	54	4.4%

Although the table shows a tendency for the rent ratio to be higher in large cities, the common figure of 4.4% is by no means as high as has frequently been asserted.

The same data classified according to the amount of sales indicate:

RETAIL SHOE STORES

Sales annually	*Number of stores*	*Percent rent to net sales*
(A)—Less than $30,000	101	3.3%
(B)—$30,000 to $49,000	102	2.9%
(C)—$50,000 to $99,000	105	3.0%
(D)—$100,000 to $249,000	67	3.9%
(E)—$250,000 and over	46	3.9%

In sales group (A) rent figures showed a wide dispersion, ranging from below 1% to half a dozen firms with 8% or more. In sales group (B) individual figures ranged from below 1.5% to above 6%. In sales group (D) in thirteen of the sixty-seven stores expense for rent was more than 6% of net sales.

The belief frequently is expressed that shoe firms in large cities pay much higher rents in proportion to net sales than shoe firms in smaller cities. Since most shoe firms with sales of $250,000 and over are situated in fairly large cities, the common figure for rent expense in sales group (E) apparently indicates that many high rents in cities are not out of proportion to the volume of sales actually made.

Operating expense studies for 83 retail shoe stores from 1918 to 1922 indicated rent ratios to net sales as follows:

RETAIL SHOE STORES

Year	*Rent ratio*	*Wage ratio*
1918	2.7%	......
1919	2.3%	8.3%
1920	2.4%	9.7%
1921	2.9%	10.4%
1922	3.3%	10.4%

Harvard studied 443 retail grocery stores for 1922. Classified according to sales the results appear as follows:

RETAIL GROCERY STORES

Sales Group	*No. of firms*	*Rent ratio*
(A)—Less than $30,000	64	2.1%
(B)—$30,000 to $49,000	101	1.6%
(C)—$50,000 to $99,000	160	1.3%
(D)—$100,000 to $149,000	60	1.1%
(E)—$150,000 and over	58	1.0%

The common rent figure for all firms was 1.4% of net sales.

The figure 2.1% in sales group (A) was higher than that in any group. Although five reported expense for rent greater than 4%, there were twenty that reported less than 1.8%. In group (B) there were eight firms that reported rent ratios greater than 3% and twenty less than 1.2%. In group (C) fourteen reported in excess of 2.5%. Either these firms were paying higher rentals than their locations justified or they had not succeeded in obtaining a volume of sales that measured up to the potential market. On the other hand, forty-six firms in this group had rent expense amounting to less than 1% of net sales.

Normally retail grocery stores, since the trading area from which they draw is relatively small, do not require such high rent locations as some other types of unit stores, shoe or jewelry stores, for example, which must attract patrons from a wider area.

The common figure of 1.4% is slightly higher than the common figure of 1.3% for the stores reporting in 1914 and still higher than the common figure of 1.1% shown in both 1918 and 1919. Although these figures are, at best, only roughly comparable for the several years, it is interesting to observe the small differences in the rent expense over a period of great changes in prices and general business conditions.

Retail hardware stores were studied for the year 1919, and for some previous years by Harvard University. The common figure for rent expense was 1.7% of net sales.

Thirty-five retail jewelry stores reporting to the Harvard Bureau for the years 1918 to 1921, and one hundred seventy-one reporting for 1922, indicated common rent ratios as follows:

RETAIL JEWELRY STORES

1919	3.7%
1920	4.0%
1921	5.8%
1922	4.8%

The figures for 1922 showed a wide range, from less than 2% to above 12%. The grouping was fairly well defined, however, around the common figure of 4.8%. This ratio does not include rent paid for space occupied by the repair departments—only that properly applicable to the merchandise business.

In a similar manner one hundred forty-nine department stores were studied for the years 1920 and 1921. In 1922, 340 department stores with net sales of less than $1,000,000, and 151 department stores with net sales in excess of $1,000,000, reported.

In these cases the findings were as follows:

DEPARTMENT STORES

1920	2.1%
1921	2.6%
1922, smaller sales	2.9%
1922, larger sales	2.9%

In order to have these common figures for rent on a comparable basis the rental figure included the amounts paid for rent of store, warehouse and garage, or a fair charge for the rental value of such premises when they were owned by the store. Where taxes, repairs, insurance and depreciation on real estate were borne by the store these were included in the rental figure as payments made in lieu of rent.

Although in 1922 in the group with sales of less than $1,000,000, thirty-seven firms reported rentals amounting to more than 4%, at the other end of the range were eighty-one stores in which rent expense was less than 1.6% of net sales.

In general chain stores seem to have lower rent ratios than the independently operated stores.

Similar ratios are sometimes available for businesses other than retail merchandising. The Bureau of Business Research, Harvard University, has made studies of the wholesale drug business and the wholesale grocery business for the year 1922. One hundred wholesale drug firms reported to the bureau and the common rent ratio was 0.8%. Rent figures for individual firms showed a fairly well defined concentration around the common figure of 0.8%. Nine firms reported rent expense less than 0.5% of net sales. On the other hand nine firms reported expense amounting to 1.5% or more of net sales. Real estate charges such as taxes, repairs, insurance, depreciation on buildings, etc., when borne by the wholesaler, were included in the rent figures.

Two hundred seventy-seven wholesale grocery firms reported for the year 1922, the common rent expense ratio being 0.5%. The results of the survey were tabulated according to four sales volume groups. In the first group, 126 firms with net sales less than $500,000, there were seventeen firms paying rent in excess of 1% of net sales and there were twenty-eight firms with rent ratios ranging from 0.3% to 0.4% of net sales. In the second group, 153 firms with net sales between $500,000 and $999,000, thirteen reported rent expense amounting to more than 1% of net sales. Nevertheless, there was a well defined group of firms in the lower part of the range whose rental figure tended to center around 0.4% of net sales. In the third group, 106 firms with net sales between $1,000,000 and $1,999,000, five firms reported rent expense in excess of 1%, but for a small, well defined group of firms in this volume classification, rent expense tended to center around 0.3% of net sales. In the fourth group, 57 firms with net sales in excess of $2,000,000 there were eight firms that reported rent expense below 0.3% of net sales. Four firms reported rent expense in excess of 1% of net sales. However, it is notable that in each of the four volume classifications the common figure for rent expense was identical—0.5% of net sales.

Trade associations the country over have given great attention to the question of uniform accounting systems and have been able in a number of cases to gather comparable data with which to study operating expenses. Information collected by them will be useful to appraisers of real estate, provided the rent items are properly analyzed. For example, for shoe manufacturers and wholesalers, mostly located in the central west, we have the following data:

SHOE MANUFACTURERS AND WHOLESALERS
For the year 1922

Sales group	*Rent ratio to sales*	*Rent ratio to costs*
Less than $500,000	0.93%	5.0%
$500,000 to $1,000,000	0.67%	3.5%
$1,000,000 to $2,500,000	0.89%	4.5%
$2,500,000 to $5,000,000	0.53%	2.6%
$5,000,000 and over	0.17%	1.3%

The common figure for all firms indicates a rent expense equal to 0.69% of net sales, and 4% of total costs. The same data has been kept in this line of business since 1915, and the common figures for all firms are given in the table below for the years 1915 to 1922:

SHOE MANUFACTURERS AND WHOLESALERS

Year	*% rent to sales*	*% rent to costs*
1915	0.64	4.2
1916	0.53	3.8
1917	0.47	3.2
1918	0.48	3.4
1919	0.47	3.4
1920	0.51	3.4
1921	0.67	3.5
1922	0.69	4.0

The average rent percentage of the volume of sales reported by 315 printing establishments which are members of the United Typothetæ of America is 2.91%. Classified according to size by sales these data show:

PRINTERS

Sales group	*% rent to sales*
$ 18,825	5.26
27,625	3.37
55,235	3.05
114,100	2.71
208,100	2.72
330,000	2.53
563,400	2.68
1,854,000	3.16

As the percentage of rent to net sales or total costs diminishes the value of such data to the appraiser becomes much less. Where rent is not an important item in the costs of doing business a greater dispersion in rent ratios among the different firms will have little effect upon their business stability.

These are average statistics and their principal value lies in the fact that they indicate differences in the relative importance of location to different business enterprises.

In making an estimate of the gross income which it is possible to secure from a building, the valuator divides up the rentable space into stores, offices, etc., and tries to discover what combination of uses will be most productive. Suppose in a city of 100,000 population a store space is rented to a retail hardware firm and that the proprietors have told the appraiser that in the location they are able to do $200,000 net business annually. Suppose, however, that a shoe store enterprise is convinced that it can do in excess of $100,000 net business. Should the shoe store have the space?

Hardware	$200,000 × 1.7% = $3,400 rent
Shoes	100,000 × 3.9% = 3,900 rent

Obviously the space is better used by the shoe store business, and from the real estate point of view is the better competitor for the location.

We have indicated the common devices used in securing estimates of gross rentals. The deductions from gross rentals require some discussion inasmuch as the net return figure must be nearly correct in the process of appraisal by income analysis. Let us consider the deductions.

DEDUCTIONS

The computation of the net income is made by securing the level annual gross income as above and deducting therefrom all of the expenses, taxes and depreciation annual items. The total deductions each year are likewise leveled so that an equivalent level net income figure is secured. The valuator will be very sure to adjust the current statement of the operation of the property so that it will be representative of the long-time and average statement. The devices which are used are indicated below.

Where the building is managed by the tenant and the owner under a net lease, all these items except depreciation and obsolescence may be omitted if an appraisal is made for the owner of the property, but they must be considered if the appraisal is made as to the value of the lease equity, in other words, the tenant's interest in the property. If, however, the building should be rented to a single tenant who makes all repairs and pays all managing expenses except insurance and taxes, which is frequently the case, then in appraising for the owner the items of obsolescence and depreciation must be added to insurance and tax expense. In other words, the terms of the lease or leases in every case are carefully studied to see exactly what obligations either the lessor or lessee assumes and the distribution of expense items would be governed thereby.

If a property is leased to multiple tenants and the landlord bears all the expenses of the building, salaries, heating, water, lighting and repair expense are added to the above items. These items should be considered separately. If possible, an itemized statement of the expenses of the building for the past year is secured. It is better, of course, to secure statements for a term of years previous to the appraisal in order to determine a typical year. It is compared with a list of expense items prepared in the appraiser's office to see whether there are any omissions. This list should be kept up to date from time to time as new information is gathered. In cities where there is a building managers' association, a building managers' form can be obtained, which is of great assistance in showing the detailed items which make up total operating expenses. Another great assistance is to secure as many complete statements of other buildings as can be obtained in order to secure not only the list of items, but also a comparison of costs. These should be kept ready for handy reference. From these various sources a tabulation can be formed which will give a relation of expense items in buildings of various characters, sizes and locations. It is well known that the expense ratio increases as the size of the building decreases and a tabulated statement can be made covering this fact, which, while necessarily somewhat crude and inaccurate as regards specific buildings, will be of great assistance in comparisons. A study of these data will enable the appraiser to form a very close calculation of the typical year's expenses. The market trend of certain expense items must also be taken into consideration in building the total deduction figure into a typical level long-time quantity.

Wages and Salaries.—In large cities where the unions are strong and in buildings of a character where it becomes necessary to work with the unions to secure competent help, the union scales are the going rates, and while the union scales usually govern from year to year, the tendency has been upward for some years past. An appraiser, in determining the typical year's expense, is justified in using the going scales. If on examination of the building and comparison of data the appraiser is of the opinion that the building is under-manned, he is justified in increasing his estimate the amount allowed for salaries for the reason that if a building is under-manned certain functions are neglected which sooner or later must be corrected by a large expense in the repair item.

Inadequate help reflects itself in the rental income. On the other hand, if service approaches perfection, higher rents are obtainable. In the larger buildings practically every department in the management and repair of the building is cared for by a regular staff. In smaller buildings it is cheaper to employ from time to time such extra help as may be necessary. The item of extra help is not to be overlooked, but rather carefully estimated and included.

If salaries and wages are not governed by the union scale, the appraiser is familiar with the going rates paid for the class of labor performed and in this way can determine what the wage scale should be. In the larger buildings we find the regular staff employed by the year, which covers practically all the building industries, such as electricians, plumbers, piping trades, and painters and decorators. However, in practically all the large buildings, as well as small ones, the larger repairs are made by outside contractors, such as tile setting, major elevator repairs, roofing, cleaning outside walls, plate glass replacing, changes of front for stores, or any large item of carpentry.

The agency cost of management is governed by special contract and may range from 3 to 5% of the gross collections. In many cases the management of a building is handled by a salaried agent. In this case not only the salaried agent, but the rental value of his office, all office expense, such as stationery and supplies, his bookkeepers, clerks and collectors, are items of expense.

Heating.—It will generally be found that the heating cost per annum can be accepted as correct from the statement of expenses obtained from the building. As to change of fuel, installation of stokers, oil burners, etc., this is a problem for the heating engineer and does not properly come within the province of the appraiser. It can be safely assumed that this item is correct. Formulas for determining the amount of fuel required are obtainable from professional heating engineers, based upon the area, height and exposure in the building. The use of such formulas is sometimes of great value if an appraisal is being made of a hypothetical building or a building not yet erected.

Water and Lighting.—The regular meter charges furnished by the building statement is sufficient for the appraiser's use. If actual cost is not obtainable, the experience of the appraiser must be relied on.

Repairs.—The usual costs for annual repairs can be taken from the furnished statement. If one is not obtainable, then again the experience of the appraiser, supplemented by such information as he can obtain, must be relied on.

There are, however, certain repairs and replacements which occur only at intervals, such as roofing, plumbing, replacement of boilers and piping and electrical replacements, major elevator repairs, replacement of obsolete or worn-out machinery, etc. The appraiser should make an annual charge for these items as a percentage to be deducted from the gross rent. It is determined by experience or research and based on the life expectancy of different items. One list used by some of the best engineering firms is given.

AVERAGE DEPRECIATION ON OFFICE BUILDING EQUIPMENT

Boilers:	
Water tube	4.0%
Fire tube	5.5%
Stokers	5.0%
Plant piping	5.0%
Coal and ash handling	7.0%
Engines:	
Slow speed	4.0%
High speed	5.5%
Generators	4.0%
Pumps	4.0% to 5.0%
Compressors	4.0% to 5.0%
Motors	5.0%
Ventilating apparatus	3.0%
Steam piping (supply and return)	5.0% to 6.0%
Radiation	3.0%
Plumbing	4.0%
Electric wiring	5.0%
Switches	5.0%
Electric fixtures	4.0%
Elevators, electric	4.0%
Elevators, hydraulic	4.0%

From some such list as this an annual charge can be made up, but it must be remembered that this item is really depreciation and is increased by a depreciation charge on the structure of the building.

Supplies.—The necessary supplies in running a building, such as soap powder, mops, brooms dusters, etc., and engine-room supplies, is a variable item. Again a building statement or personal experience must be relied on. These items can only be estimated in any case as the conditions governing each particular building regulate the amount. The age, type of structure and equipment, its use and requirements of the tenants are controlling factors. Usually the appraiser accepts the building statement or sets aside a lump sum annually which in his judgment will cover the item.

If bills are discounted, it is done with money belonging to the owner in the hands of the agent. Therefore, the discounts should be credited to the owner. The contrary practice is wrong ethically, although it is quite common. Discounts on bills are not usually taken into consideration in forming a list of deductions, as the appraiser's estimate of expenses must necessarily be general and not particular, the constant fluctuations of costs making it impossible to determine an annual amount with any degree of exactness.

It is generally safe to assume that an estimate of expense based on area is nearly enough correct for the appraiser's purpose. The Building Managers' Associations have such tabulations which are worked out from actual experience in many buildings of different types. The tabulations are probably the most reliable of any general data that can be obtained.

Where the structure is a very typical one, the expense per square foot of rentable space can be found by comparison, and the result for total expense thus found will usually correspond very closely with the actual statements. This device is therefore to be recommended in estimating the total operating expenses in hypothetical buildings and where actual statements are not available. Like all such estimates, its accuracy is dependent upon the quantity and quality of experience data which have been secured

Some appraisers estimate the total operating expense by assuming it to be a constant percentage of the gross income. That is, they will accept fifty per cent (or some other percentage) of the total gross income as representative of the total operating expense, depreciation and taxes. This system has no justification whatsoever as an appraisal process. The operating ratio, so called, is a very valuable proposition for the building manager to compute and watch as a part of his cost-accounting system, but the inference that a reversal of the procedure can be correct is by no means warranted and more definite calculation of expense items should always be made.

In certain cases building statements include items of expense which are not fair charges against the operations of the real estate. Again certain of the charges which appear may include costs which are not fairly attributable to the real estate operations. The appraiser seeks the typical and the true, and he removes superfluous items, supplies omitted items, and segregates combined items until the total deductions figure is truly representative of the amounts which would be met by a purchaser of the real estate.

Taxes.—It is probably better practice in valuing a building to take the present year's taxes as an item of deduction than to attempt to prophesy what the future may hold.

There are, however, certain instances where the appraiser is asked to say what in his opinion will be the value of a property some years hence. This is prophecy, not evaluation, and brings into consideration many items that are incidental only in a present valuation of the property. In a case of this kind a "tax trend" can be formulated, but it must be presented in the report in such a way that the client will understand that it is only a theoretical trend and not an actuality to be depended on.

In some cases a close prophecy can be made when the budget of city running expenses is known and there are in evidence municipal or other expenditures to be made that are payable from general taxes.

Special assessments are a part of taxes and can be looked at in the same way except that street improvements are frequently levied payable over a long term of years at a fixed interest rate on deferred payments. In a case of this kind for a term of years specified this item is fixed. There may be, however, other improvements that it can be readily seen are bound to occur within the period the appraiser is reviewing. The cost of these improvements can be estimated with reasonable accuracy and if the appraiser is endeavoring to cover a period of years a deduction allowance should be made.

To estimate the taxes against a projected structure, two processes are feasible:

1. Comparison with present taxes of similar structures already built.
2. Determine the value of the proposed structure. Take the average percentage on similar buildings used by assessors and compute in the same way as do the assessors. For instance: If the assessors usually take two-thirds of the real sound value of the building as a value and taxes are levied on one-half value, then two-thirds of the sound value divided by two, multiplied by the current tax rate, will produce a fair but ample estimate for deduction. In the report, however, the taxes are presented as estimates, not as facts.

Land Taxes.—In some cities land taxes are distributed by means of formulas. There are in Chapter XII formulas and tables to illustrate this method, based on the selection of base values in each block with formulas to determine corners, reflected values and alley influences.

Where a system as above is in use the appraiser may, by placing his own base value on the block and following as near as possible the trend of thought followed by the assessors, determine approximately a tax charge which will be sufficiently accurate for his purpose.

Insurance.—The insurance items are usually not very great. Fire insurance is usually 80% of the sound value of the building above the lowest floor level. Thus:

Building value	$160,000
Below lowest level	10,000
Insurable value	$150,000
80% insurance	120,000

Multiplying $120,000 by the rate (say 40 cents per $100 per annum) will give the annual premium—$480. Usually insurance can be secured at a lower rate under three-year or five-year policies. Thus a three-year policy might be obtained for two and one-half times the annual rate, which would reduce the annual item for fire insurance to $400.

The premiums required for all other forms of necessary insurance are also included, general liability insurance, boiler insurance, elevator insurance, etc. Plate glass insurance in stores is often carried by the tenant under the terms of the lease.

The appraiser has little difficulty in determining insurance costs. If occupancy and type of structure are given, the Board of Underwriters will give him an approximate rate. Where there is no Board, rates can be obtained from the local insurance agent.

Depreciation and Obsolescence.—The yearly depreciation and obsolescence item to be included as a deduction from gross income should be sufficient to replace the capital value of the building as it stands to-day at the end of its remaining useful life. There are several methods used in calculating and estimating depreciation and obsolescence and discussion of these mehtods has been reserved for Chapter X.

Computation of Net Income

Having calculated a figure representing the average level annual gross income, and having secured an amount which is typical of the sum of the deductions yearly, the valuator finds the net income by taking the difference between gross income and deductions. Net income, thus found, includes the annual interest, rent and profits produced, and is used in computing the value of the property from an investment point of view.

CHAPTER VII

THE APPRAISAL OF INCOME PROPERTY

The essential concepts utilized in the evaluation of income-producing real estate were outlined in Chapter V and the considerations involved in the computation of net income were discussed in Chapter VI This chapter deals with the development of the evaluation processes as applied to the general case of income property indicating the principles involved in finding the total valuation, the distribution of value to land and building, the measurement of over-improvement and under-improvement, and the measurement of the quantity known as "improved value." The chapter is concluded by examples and illustrations of the income evaluation processes applied to business properties.

THE VALUE EQUATION

It was found in Chapter V that the value of an income-producing property was the value of the new utility and the value remaining in the old utility less the cost incurred by making the change, each of these elements corrected for the times at which they operate. The interrelationships between all of the various elements which were introduced in the analysis were found to be always the same.

Hence if each of the factors is represented by a symbol, we are able to indicate their relationship one to another by an equation. In formulating an equation to represent the value of any piece of income-producing real estate we will expect the value to be a function of the present and future incomes and the relative costs of the buildings. There are many qualifying factors in the equation, each of which will require separate and specific treatment. The equation of value and the development of the salient facts concerned with the items in the equation will form most of the consideration exemplified in this chapter. It should be observed that the value equation given below is not a formula to be used by appraisers, but is simply a pithy or brief method of stating the relationship which exists between the various elements of value in income property.

If V is the value of a real property, and F and P represent respectively the future annual net income and the present annual net income, if C represents the direct costs of erecting a new building, and if A represents all incidental costs and losses resulting from rebuilding, then the value of the property is indicated by:

$$V = \delta\left(\frac{F}{\theta}\right) - \delta\,(A + C) + \delta\theta\,(P)$$

in which δ is a coefficient to reduce an amount deferred at compound discount for a period of time, and in which θ is the going interest rate on capital invested in this character of enterprise. If $\delta\left(\frac{F}{\theta}\right) + \delta\theta\,(P)$ is greater than $\delta\,(A + C)$ it will pay to replace the old building by a modern structure. Otherwise it will not. In this manner it is possible to ascertain the proper time for rebuilding a site when the highest and best use of the site is known.

The factors which enter into the value equation are as follows:

$\delta\left(\frac{F}{\theta}\right)$ is the present worth of the future net income to be derived from the new improvement. F is the annual net income. This divided by the selected interest rate capitalizes the amount and indicates its value as an immediate perpetuity. δ defers the value, and indicates the present worth of the perpetuity.

The item F is computed by making deductions which are the annual expenses or charges, from the gross income of the property. Let R represent the gross income or rental. Let the deductions be represented by:

E—Expenses of operation: heat, elevators, janitor, agent's commission for management, etc.
T—Taxes and assessments.
I—Insurance premiums.
r—Repairs and decorating.
D—Annual depreciation on building.

In this manner $F = R_f - (E + T + I + r + D)_f$, in which the sub f indicates that the amounts are estimates of the operations of a building not yet constructed.

The item P is computed in the same manner as F. It is the difference between the gross income of the existing building and the present annual charges. Thus: $P = R_p - (E + T + I + r + D)_p$, the sub p indicating the operations of the existing improvement. $\delta\theta$ is a coefficient which indicates the present value of an annuity. The present annual net income is therefore treated in the equation as an annuity over the period until the change of utility takes place.

The items A and C in the equation represent all expenditures which are incurred in connection with the removal of the old building and the erection of a new one. These expenditures are of two kinds: (1) The apparent cost of the new building structurally—the item C; and (2) early vacancies, architect's fees, wrecking, interest on capital used during construction, tag-end vacancies in the old building, and so on—the item A.

The item C is the amount of outlay which is directly included in the cost of constructing a new building. It does not include carrying charges but represents the actual structural cost of a building which is the best improvement for the location.

The item A includes all of the indirect costs involved in the erection of the new building and all losses which result directly from the change of utility and at the approximate time of the change. The total cost of the new building includes item C and such A items as are directly associated with the new building; that is, the indirect costs of the new building. The remaining portion of item A is the resultant of losses incurred in the old building because of its removal.

Utilizing all of the factors developed above, the value equation now becomes:

$$V = \delta\left[\frac{R_f - (E + T + I + r + D)_f}{\theta}\right] - \delta\,(A + C)$$

$$+ \delta\theta\left[R_p - (E + T + I + r + D)_p\right]$$

One question might be raised, namely, the capitalization of F making it a perpetuity. That F is a perpetuity is shown thus:

$$F = R_f - (E + T + I + r + D)_f$$

Each of the items in the above is an annual receipt or charge and is approximately level. D represents in dollars the amount of physical deterioration and depreciation which occurs each year. It is included as an annual deduction from gross receipts. It is assumed that the charges each year are accumulated until, at the termination of the useful life of the building, the fund accumulated equals the cost of erecting a similar new building. Hence provision is made in item F for the replacement of the same building and $\left(\frac{F}{\theta}\right)$ is not a faulty concept.

The two limiting cases between which the value equation indicates relationship of items, are vacant property suitable for an income producing utility, and income property which is improved to its highest and best use.

In vacant property of this character, the equation when reduced becomes:

$$V = 1\left[\frac{R_f - (E + T + I + r + D)_f}{\theta}\right] - (A + C)$$

This is the third process described in Chapter IV under "Methods applicable to land through the agency of building value."

In the case of an improved property at its highest and best use, the equation when reduced becomes:

$$V = 1\left[\frac{R_p - (E + T + I + r + D)_p}{\theta}\right]$$

That is, the present net income is treated as an immediate perpetuity, and the value of the property is the capitalized value of the net income. This is the fourth process described in Chapter IV under "Methods applicable to total value of improved properties."

Capitalization of Rental Income.—The items in the equation are still under consideration. Among the items were θ, δ, and $\delta\theta$. The significance of these is discussed below.

The ownership of a real property is conceived as the right to receive commercial rents—which rents are paid periodically. Ownership is, then, the right to receive periodic payments in the form of an income. The stability and bargaining instrument which indicates the amount of rental is the lease. The landlord and tenant bargain and make a contract. The rental income of a property may be represented in one or a number of leases, and the provisions in the lease contracts may affect the total value of the property (see Chapter XI).

The present value of an income which is promised in the future is a function of compound discount, the rental rate, and the term or period during which the income is paid. In brief the value of a promised rental equals that amount of money which, placed at a normal interest rate of return in any average investment of similar risk and security, would accumulate amounts exactly equal to the rental payments at the times when they become due. The future payments are not now worth their face amounts. Appraisers can ascertain the rental payments and the dates on which they become due from the leases, or from fancied normal typical leases where properties are not under lease contracts.

The same reasoning applies likewise to single amounts which are to be paid in the future. All of the items included in A are amounts deferred, and they are reduced in the equation by the operation of compound discount.

The item θ is the selected rate of interest used in computing the effect of time upon the other items. The item δ indicates that the items which it multiplies are amounts deferred, and that their present values are to be found by discounting. Thus δ is always less than unity. The item $\delta\theta$ indicates that the items which it multiplies are periodic payments over a finite term of time, and that their present values are to be found by discounting. Thus $\delta\theta$ indicates the present value of an annuity, in which the annual payments are the amounts which it multiplies, in which the selected interest rate used is θ, and in which the term runs from the present time until the time of the last annual payment.

In the equation the future annual net income has been capitalized as a perpetuity by dividing by θ, and the amount thus secured has been deferred by δ to the time when the change in utility occurs. The A and C items are amounts which are expended or operate at the time when the change of utility occurs and they are likewise deferred by δ. The present annual net income operates from the present time until the time of the utility change and has therefore been treated as an annuity over this period. Hence, the immediate value of the income over the term is indicated by the coefficient $\delta\theta$.

In the appraisal procedure the correct selection of interest or discount rates is of great importance. A variation of 1% in the selected interest rate will make a very great difference in the value secured, and the control over the value estimate is concerned very closely with the rates so selected. It is therefore vitally important that the valuator who uses the method of appraisal by income analysis select the proper rates. He may base his selection upon the character of the investment and make the rate correspond to the rate of return actually produced by most investments of a corresponding nature.

The Cost of Changing Utility.—Among the items in the value equation was the item A, which is the symbol selected to represent the algebraic sum of all those factors which are expended or received by a property owner when he changes the improvement of his property. These items of value are frequently overlooked by appraisers and no allowances are made for them. But some consideration of these elements indicates that they are not negligible unless remotely deferred, as in those cases where a direct capitalization of net income is permissible. Hence the following discussion of these factors.

When an owner contemplates the removal of the present building, one of the first considerations he has to make is to arrange for the present lessees. If he makes new leases on a part of the space, he is forced to make the date of expiration prior to the date on which he desires to remove the building, or else require cancellation clauses. Many tenants do not care to sign shorter leases and full rent cannot be secured for leases which include cancellation clauses. The result is a period during which the owner usually has considerable vacant space in his old building, due directly to the contemplation of the new improvement. These tag-end vacancies are unavoidable and they introduce a loss in rentals which, in computation, can be disposed of as though it were a lump sum.

Let us assume that a building comprising 10 retail stores, each rented for $2,400 a year, is to be replaced. Rentals during the final years would probably suffer in some such manner:

Months to Time of Wrecking	*Number of Rented Stores*	*Rent Lost*	*Total Rent Lost*
24	10	None	None
21	10	None	None
18	9	$600	$600
15	8	1,200	1,800
12	5	3,000	4,800
9	3	4,200	9,000
6	2	4,800	13,800
3	0	6,000	19,800

In this case there is $19,800 worth of income which is perpetually lost. This sum is not provided for in the equation under the third factor (namely, $\delta\theta\ [R_p - (E + T + I - r - D)_p]$), inasmuch as this factor represents the present worth of an annuity of the net income up to the time of the replacement. Thus the item representing the loss in rental introduced by tag-end vacancies should be deducted. It is likewise obvious that it should be deferred by δ to the time of the change. In the example given there was the equivalent of 82.5% of one year's full rent lost. In this instance the loss is somewhat greater than would be general; nevertheless, the appraiser will follow a correct procedure should he make the estimate in a roughly analyzed form as above.

Assume another case: An apartment building in which there are six apartments, each rented for $85 per month. Rentals during the final years would probably suffer in some such manner:

Months to Time of Wrecking	*Number of Rented Stores*	*Rent Lost*	*Total Rent Lost*
12	6	None	None
9	5	$255	$255
6	2	1,020	1,275
3	0	1,530	2,805

In this case $2,805 rental income is lost. In the case of apartments, leases are usually made for somewhat shorter terms than for stores, and the tag-end vacancies will not begin to appear so soon. It is probable that the greater part of the loss will be represented by the rentals lost during the very few months immediately previous to the wrecking.

It should be noted that the vacancies referred to in these cases are not the ordinary vacancies which buildings might have at any time. The rental income lost by virtue of ordinary vacancies are considered as sums which do not exist. That is, the amount of the present gross annual income (R_p) is smaller than the rental price per unit of space times the rentable space by an amount equal to normal vacancies. The loss here computed is for rentals that could have been collected had not a new improvement been contemplated.

Some leases contain clauses which provide that the lessors may cancel the leases prior to their dates of expiration upon the payment of a stipulated bonus or premium to the lessee. When a new improvement is contemplated and is to be built at a date prior to the date of expiration of such leases, the premiums paid to tenants for the exercise of this cancellation privilege becomes an item similar to the loss introduced by tag-end vacancies. Hence, these premiums are added as part of the item A in the value equation.

The prices paid to wreckers and received from the sale of salvaged materials from the old building constitute lump sums at the time of changing utility for which allowance should be made. Many appraisers assume that the cost of wrecking and salvage practically cancel each other. In many cases this is approximately true, but, should a balance remain, either in favor of or against the property owner, it is a genuine item to be added positively or negatively to the item A in the value equation. Not infrequently this item occurs in the form of a lump sum when the appraiser comes to study the problem, inasmuch as the wrecking companies contract for the removal of the building and themselves sell the salvaged materials.

The amount of money received for a building which is sold as such, to be moved to another site, may most easily be treated as a salvage value and is deducted in securing the amount of item A. In practice this value could not be included unless the sale and amount are certainties. The remote possibility of moving a building would not be considered as adding to its value.

How long a time does it take to remove an old building, to build a new building, and to rent most of the space in a new building? A rough knowledge of building operations will give estimates for various kinds of structures. During this period there is little income. Our value equation assumes the instantaneous removal of an old building and the appearance of a well-rented new one. This is warranted insofar as the expense items and deductions go, but the income disappears for the period and should be estimated and added to item A.

Architect's fees, appraisal fees and other similar payments for services, such as broker's commissions, are met in connection with removing the old structure and replacing it with another. These are properly added to item A. As for the inclusion of the broker's commission here, assuming as it does a sale of the property, the amount of such a commission cannot be correctly left out. The valuator is placing a sale value on the property which in itself assumes a sale. Further, the purchaser pays the commission in reality inasmuch as the seller adds the broker's commission to the sale price of the property and passes this cost on to the purchaser.

As has already been indicated early vacancies in a new structure entail a loss in rents which constitute a part of item A. The capital utilized for expenditures during a change of utility appears upon the completion of the change unimpaired in the form of a producing capital instrument. But during the period between the time this working capital was borrowed or appropriated for the purpose and the time when a normal return on it is enjoyed, the capital has not been producing interest. It is proper to include the loss in interest as a lump sum and a part of item A.

To compute the amount of interest lost the selected interest rate is applied to the amount of capital advanced to pay for services, materials and as collateral security for the old building—over a period equal to the period elapsing between the date of appropriating the money and the time of the actual placing of the rentable space on the real estate market. In general accounting it is frequently a practice to include as an overhead charge or an indirect cost, interest to the extent of one-half of full interest over the period of building. This practice is supposed to represent an average and is based on the supposition that the amounts of capital used in construction flow out at a constant rate over the entire period. Where a very long period of building construction might be expected, this device for computing the interest lost should give fairly accurate results, but in cases where the building period is shorter, a larger percentage of interest would probably be included as lost, and as a part of the item A.

The direct cost of construction of the new building is not an element in item A. Item A was defined as the algebraic sum of all expenditures incidental to the construction of a new building and the direct construction costs were included in the computation in the item C.

In arriving at a figure to represent the total cost of a new structure, the direct costs of construction (item C) are added to those additional amounts included in item A which are attributable to the new building—the indirect costs or permanent overhead. Item A might have been divided into two amounts in this manner in the equation, one the costs of changing utility attributable to the removal of the old building, and the other, the costs of changing utility attributable to the erection of the new building.

There are possibly other items which would be included in item A, but it is assumed that those mentioned are important from the quantitative point of view. To recapitulate: The sum of the lump sums lost or gained, incident to:

1. Tag-end vacancies in the old structure,
2. Premiums paid for cancellation privileges,
3. Wrecking and salvage,
4. Period of "no rent" during wrecking and rebuilding,
5. Fees for services, paid to architects and Realtors,
6. Early vacancies in the new structure,
7. Interest losses on capital utilized during the period of the change of utility,

is equal to and constitutes the item A in the value equation. Item A represents amounts frequently not considered by appraisers, and it is felt that a fair treatment of the conditions surrounding the evaluation of property cannot overlook these factors.

Application of the Equation.—The value equation is simply a summarized method of expressing the method of appraising by income. In the application of the equation several important factors should be observed:

1. The method which the formula indicates presupposes a somewhat reliable determination of the gross rentals now, the expenses, and other deductions, the selection of the proper rates per cent of interest and discount.

2. The method assumes that the appraiser is discreet in selecting and deciding upon his judgment as to potential highest and best use. In other words, the very process of appraisal by income involves a study of district mutation and the directions of city growth.

3. The method, it will be seen, involves estimates of the cost of constructing the improvements in order to estimate the depreciation deductions and obsolescence. Sometimes a greater analysis of depreciation and ob-

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VALUED BY THE PROCESS OF APPRAISAL BY INCOME ANALYSIS

solescence than is indicated in the simple statement of the equation is desirable (See Chapter X). In most cases the appraiser is justified in making no allowance for the value of the old building other than what it produces during the remainder of its life. In practical cases no value whatsoever is given in arriving at sale prices, to very old and inadequate improvements.

4. The formula when solved gives the total value of the property, including both the land and the building. This is, strictly speaking, a very correct concept—the value of land and building in the case of all income-producing properties is genuinely merged and a division of the value between land and building is purely a theoretical concept, but one which we use daily. In the case of valuable vacant ground, this is still true. The sale value of the ground to-day is purely the present worth of the future net income of the ground which will be secured because of an improvement. Thus the value of urban vacant land is not a fundamental thing in itself as many real estate men seem to assume.

Distribution of Value to Land and Building

Still speaking of business property and income property, the purchaser of income property is the owner of an investment. An investment is wealth which is used to secure an income. The income produced is a combination of economic rent and economic interest. Economic rent is produced by the ground. Economic interest is produced by the improvements. The sum of the rent and interest is the net income which the total investment (that is, the value V of the value equation) produces.

This process of thought gives us a means of theoretically dividing the total value of an income-producing property between the land and its improvements and ascribing a value to each.

The process requires that the appraiser select a rate of return which he believes a fair rate for interest to be produced by the building. This rate will, of course, be highest where the stability of real estate values is least, and will be much lower where value fluctuations are not so likely. This rate applied to the amount of the total investment in the building, provided it is the correct improvement, including both the direct costs of construction and indirect costs in the form of permanent overhead, gives the annual return produced by the building. This amount deducted from the net return which the property produces gives the annual income which is attributable to the ground, that is, economic rent. Capitalization of economic rent gives a value which may be considered as the value of the ground.

This is, however, a theoretical concept, but one which can be and frequently is used.

The converse process, namely the derivation of a building value from an assumed rate of return on ground and an assumed ground value, is not a correct procedure even theoretically. The only value which the ground can have is that which exists by virtue of a building now or in the future; hence the derivation of values in such a distribution must commence with the amount of capital investment required to construct the building.

This process of value distribution may be indicated algebraically as follows:

If: $R - (E + T + I + r + D) =$ The net return.
$\theta_B =$ Selected rate of return on building.
$\theta_L =$ Selected rate of return on ground.
$B =$ The total value of the building, including both the fair direct costs and permanent overhead charges.
$L =$ The value of the land.

$$\text{Then: } V = 1\left[\frac{R-(E+T+I+r+D)}{\theta}\right]$$

$$V = B + L \text{ and } L = V - B$$

$$(1)\quad L = 1\left[\frac{R-(E+T+I+r+D)}{\theta}\right] - B$$

$$(2)\quad \theta_L\,(L) = R - (E+T+I+r+D) - \theta_B\,(B)$$

The above relations hold true in cases where the property is improved to its highest and best use. For illustration, take an office building with an annual gross rental of \$872,000 and annual expenses and depreciation amounting to \$456,000, which represents a fair investment in the building of \$4,122,000. It is unquestionably the best improvement. If we assume that the property should produce 7¼% on its value annually, the land value is found directly by relationship (1):

$$L = \left[\frac{872{,}000 - 455{,}000}{.0725}\right] - 4{,}122{,}000$$

$$L = \$1{,}625{,}931$$

If, on the other hand, we wish to assume that the building should produce 8% annually upon its value as an investment, the annual return from the land could be found by relationship (2):

$$\theta_L\,(L) = (872{,}000 - 456{,}000) - (.08)\,(4{,}122{,}000)$$

$$\theta_L\,(L) = \$86{,}240$$

Then the rate of return on the ground would be found thus:

$$\theta_L = \frac{86{,}240}{1{,}625{,}931} = 0.053 = 5.3\%$$

The illustration serves to show that rates of return assumed for the property as a whole and for the building give us a means of measuring land value, the amount of the annual return from land, and the rate at which the land produces economic rent.

Where a property is not improved to its highest and best use the above formulas become:

$$(3) \quad L = \delta \left[\frac{R_{\mathfrak{f}} - (E + T + I + r + D)_{\mathfrak{f}}}{\theta} - B \right]$$

$$(4) \quad \theta_L (L) = \delta \left[R_{\mathfrak{f}} - (E + T + I + r + D)_{\mathfrak{f}} - \theta_B (B) \right]$$

That is, the land value is simply that indicated by the highest and best use, diminished by reason of the continued use with the old improvement over a period.

The difference found by subtracting the result found in (3) from the result found in (1) is a measure of the extent to which the existing building may be said to encumber the ground.

Over-Improvement

Over-improvement is the condition of a piece of real estate when the maximum net income procurable is not a fair return on the value of the land and the structural value of the building. A greater investment in the building was made than was warranted by the location. Such a situation is very frequent and it is desirable as well as possible to measure the extent to which a site is over-improved. There are five essential steps in the method of measuring over-improvement as follows: (1) Compute the value of property by analyzing its income; (2) find the structual value of the building by the reproduction cost process; (3) find the value of the land as though it were vacant by the recent transfer process; (4) find the total value of the property by the summation process, that is, add the land value to the structural value of the building; (5) then, if the total value found by summation is greater than the value found by analyzing the income, there is over-improvement and the amount of over-improvement is measured by the difference between these two total valuation estimates. Fig. 15 epitomizes this method.

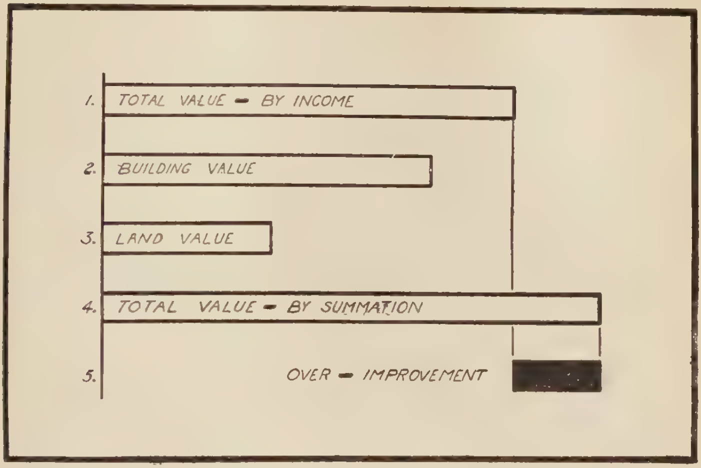

Figure 15: Method of Measuring Over-Improvement

UNDER-IMPROVEMENT

Not infrequently property is under-improved. Notable instances are those in which the buildings have not been built to the most productive height and where the lot has not been fully occupied. Under-improvement is defined as the condition of a piece of real estate when the net income produced is not as great as that which could have been secured at the same rate of return on investment by more costly improvement. A lesser investment in building was made than that which would have been possible. The concept of under-improvement assumes that some larger or greater improvement could have utilized the ground and that the income from such a larger improvement would not have been a lower rate of return on the larger investment. It is possible to measure the extent of loss due to under-improvement by assuming the greater improvement and its income to be known. The essential steps are as follows: (1) Compute the value of the property by analyzing the income

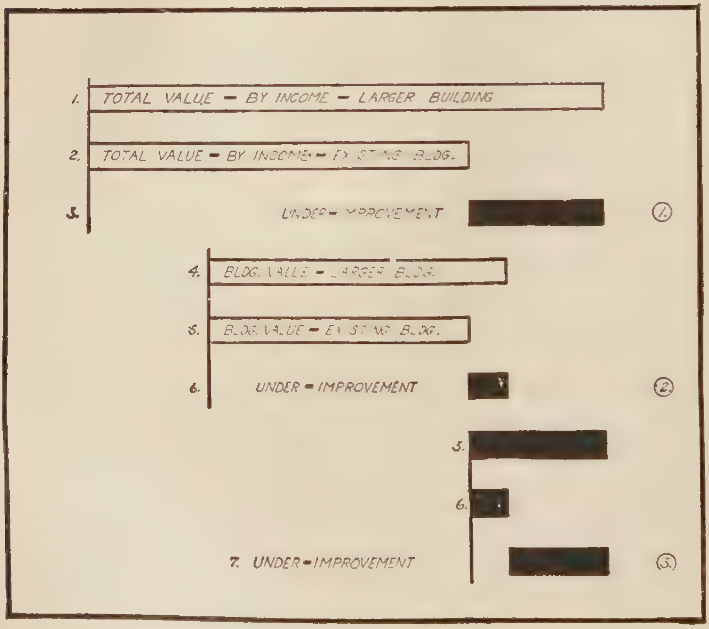
1. TOTAL VALUE — BY INCOME — LARGER BUILDING
2. TOTAL VALUE — BY INCOME — EXISTING BLDG.
3. UNDER — IMPROVEMENT
①
4. BLDG. VALUE — LARGER BLDG.
5. BLDG. VALUE — EXISTING BLDG.
6. UNDER — IMPROVEMENT
②
3.
6.
7. UNDER — IMPROVEMENT
③

FIGURE 16: METHOD OF MEASURING UNDER-IMPROVEMENT

of the larger improvement; (2) compute the value of the property by analyzing the income of the existing improvement; (3) the difference between the two total values thus found is the extent to which the property is less valuable due to under-improvement; (4) find the structural value of the larger improvement by the cost of construction process; (5) find the structural value of the existing structure by the reproduction cost process; (6) the difference between the two building values thus found is the effective difference in investment; (7) the difference between the amount found in (3) above and the amount found in (6) is a measure of the amount of improved value which is not created because of under-improvement. Thus under-improvement can be conceived and measured as a loss in any one of these three ways:

1. The difference in fair cash market value.
2. The difference in investment.
3. The loss of improved value.

Fig. 16 indicates graphically the concepts utilized in the measurement of under-improvement.

Improved Value

The increment of value which exists by virtue of the combination of a very correct improvement with a particular site where risk and hazard have been assumed by the promoter is called improved value. It appears because such properties produce a net income which is a fair return on a larger amount than would be indicated by the sum of the value of the land as vacant ground and the structural value of the building. In the measurement of improved value the following essential steps are taken: (1) Find the total value of the property by analyzing its income; (2) find the structural

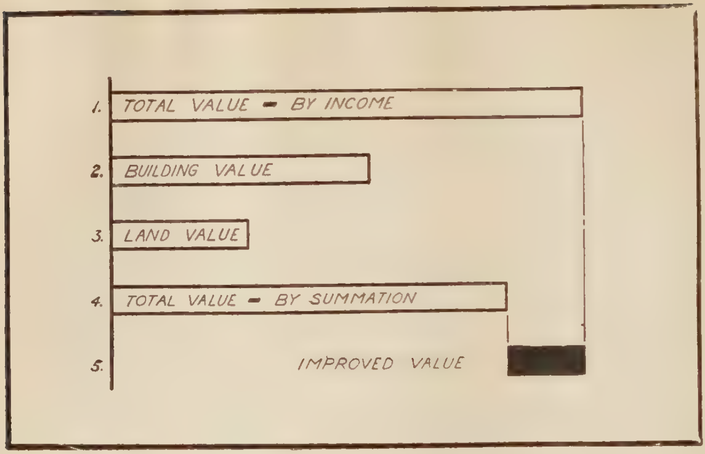

Figure 17: Method of Measuring Improved Value

value of the building by the reproduction cost process; (3) find the value of the land as though it were vacant by the recent transfer process; (4) find the total value of the property by the summation process, that is, add the land value to the structural value of the building; (5) then, if the total value found by summation less than the value found by analyzing the income, there is the presence of improved value, and the amount of improved value is measured by the difference between these two total valuation estimates. Fig. 17 represents these steps graphically.

Examples of the Appraisal by Income

I. First of all, to illustrate the evaluation of an office building property in a large city, let us assume the building to be under construction and that the client has asked an appraisal to be made giving the value ot the property after the completion of the structure and after it is rented and a "going concern." The improvement is unquestionably the correct one for the land, and is being built at an opportune time.

The correct process is the capitalization of net income.

The valuator secures the renting plans of the building and makes an estimate of the gross annual rental which he believes will persist over a reasonably long period of time in the future.

Gross Rental Estimate.

Basement, approx. 9,100 sq. ft. @ $1.00	$ 9,100
First floor, stores (see below)	60,900
Second floor, approx. 9,341 sq. ft. @ $4.00	37,364
18 typical floors, approx. 168,138 sq. ft. @ $3.50	588,483
Twenty-first floor, approx. 9,300 sq. ft. @ $3.00	27,900
Gross rental	$723,747

Itemized Store Rentals.

Store No. 1	$ 5,400
Store No. 2	6,900
Store No. 3	8,900
Store No. 4	8,500
Store No. 5	12,000
Store No. 6	12,000
Store No. 7	7,200
Total store rentals	$60,900

He then estimates the total annual operating expenses and deductions which he believes will persist.

Annual Expense.

Taxes (estimated)	$110,850.00
Insurance (fire, plate glass and liability)	2,938.33
Management	20,000.00
Losses (7%)	51,316.16
Engineering Department	20,639.18
Electrical Department	14,752.46
Elevator Department	21,779.37
Janitor Department	77,622.64
Repairs, alterations and supplies	10,678.33

Annual Expense (continued).

Miscellaneous	8,695.96
Advertising	917.38
Elevator insurance	1,453.50
Compensation insurance	200.00
Dues: Bldg. Mgrs. Assn.	50.00
Total	$341,893.31

Permanent Overhead.—(Secured from client's engineers.)

One year's ground rent	$ 70,000.00
One year's taxes	15,000.00
Insurance	10,000.00
Surety bond	33,957.00
Interest	210,000.00
Financing	350,000.00
Total	$688,957.00

Construction Cost.—(Secured from client's engineers.)

Total construction cost	$2,723,490.00

Depreciation.—Depreciation charged at 1½% per annum against the total investment in building.

Direct costs	$2,723,490	
Indirect costs	688,957	
Total investment	$3,412,447	
$3,412,447 × .015		$41,186.70

Annual Deduction Estimate.

Total annual expense	$341,893.31
Depreciation	41,186.70
Total deductions	$383,080.01

Net Annual Rental Estimate.

Gross annual rental estimate	$723,747.00
Total annual deductions	383,080.01
Net annual rental	$340,666.99

To secure a total value for the property, capitalize the net annual income at a fair rate, say 7.0%, thus:

$$\$340{,}666.99 \div .07 = \$4{,}866{,}671$$

To secure a value for the building, we may assume it to be worth its cost of construction and the permanent overhead (It is the highest and best improvement and new).

Value of the building..................	$3,412,447

To secure a value for the land, we separate the building value from the total value, thus:

Total value of the property.............	$4,866,671
Value of the building..................	3,412,447
Value of the land..................	$1,454,224

II. In the example which follows a store property is appraised. The site is not improved to its highest and best use and the application of the appraisal by income analysis under such circumstances is illustrated.

The building is an old one-story structure, occupying practically the entire lot. Each of the three stores is rented at present for $100 per month. The costs of operating the building are:

Janitor	$ 540 per year
Management	120
Heating	310
Lighting	18
Repairs	150
Miscellaneous	200
Taxes	600
Insurance	110
Total expense	$2,048

Structurally the building would probably last for ten years more, and at present it would be considered about

75% depreciated. Its reproduction value new at 30 cents per cubic foot would be:

60 × 120 × 15 × .30 =	$32,400
Depreciated	8,100

The annual charge for depreciation, based on the ten years of remaining structural life, would be $810.

The improvement which seems to be best suited for the site is a two-story brick and terra cotta front store and office building with four brick garages along the rear of the lot.

The appraiser estimates that the spaces will rent as follows:

Store A	$250 per month
Store B	200 per month
Store C	200 per month
3 front offices, each	75 per month
3 rear offices, each	60 per month
4 garages, each	10 per month

This would indicate a potential full gross rental of $13,140 per year. Reducing this amount 5% as an allowance for vacancies, rental losses, rental market fluctuations, etc., leaves an effective potential annual gross rental of $12,483.

He also estimates the operating expenses and other deductions which would obtain in such a building:

Taxes	$1,300
Insurance	276
Janitor	1,200
Coal	700
Lights	24
Water	72
Agent's commission	624
Repairs and supplies	350
Total	$4,546

A building of this character will cost about 27 cents per cubic foot to build: 60 × 60 × 30 × .27 = $29,160. The garages will cost about $1000 each, or $4000, making a total construction cost for the new improvements of $33,160.

There will be lump losses at the time of the erection of such a building which are estimated as follows:

4 months' rent from old stores	$1,200
4 months' rent from new stores	2,600
6 months' rent from new offices	2,430
Premium in old store lease	500
Interest	995
Insurance during construction	30
Total	$7,755

The architect's fees were included in the cubic foot estimate of the building cost.

Due to the fact that the present leases will not expire for two and one-half years, a purchaser would not contemplate building until after such a period. He would most certainly build at that time. Hence the appraiser considers that the old building will last for about three more years, and that after that time the new building will be built, this being the correct utilization of the site in point of the timing of changes of utility. Basing his estimate of the present value of the property on this assumption he proceeds as follows:

1. The present value of the future annual net income:

$$\delta\left(\frac{F}{\theta}\right) = (.84)\,\frac{(12{,}483 - 4526 + 829)}{.09}$$
$$= \$66{,}241$$

(.84) is the present value of 1 payable 3 years hence at 6%. $829 is the estimated annual depreciation on the new building.

2. The present effect of the costs involved in changing from the old utility to the new one:

$$\begin{aligned}\delta\,(A + C) &= (\ .84)\ \ (7755 + 33.160)\\ &= \$34{,}369\end{aligned}$$

3. The value remaining in the old structure:

$$\begin{aligned}\delta\,\theta\,(P) &= (2.83)\ \ (3600 - 2048 + 810)\\ &= \$2{,}100\end{aligned}$$

(2.83) is the present value of an annuity of 1 per annum for three years, payable in advance, at 6%. $3,600 is the annual gross rental which the old building is producing.

4. The present value of the property:

Present value of the future net income......	$66,241
Value of the old structure..................	2,100
	$68,341
Less the cost of changing utility	34,369
Present value of property...............	$33,972

5. Distribution of value between land and building:

The total value of the property.............	$33,972
The value of the building...................	2,100
The value of the land..................	$31,872

or approximately $531 per front foot.

It is interesting to the client at times to show him the successive returns on his investment under the scheme of land utilization recommended. In this particular illustration the return percentages are as follows:

	Investment	*Return*	*Per Cent Return*
1st year...........	$33,972	$742	2.2%
2nd year..........	33,972	742	2.2%
3rd year...........	33,972	224	0.7%
4th year...........	74,887	2,735	3.6%
5th year...........	74,887	7,108	9.5%
6th year...........	74,887	7,108	9.5%

III. Let us examine another case where the site is approaching a light manufacturing development, but at present is in a residential location and improved with an old apartment building.

The building is a three-story brick structure containing six apartments, rented for $5,480 per year. The costs of operating the building are $1,920. Structurally the building would probably last for fifteen years more, and at present would be considered about 50% depreciated. Its reproduction value new at 26 cents per cubic foot would be:

50 × 72 × 45 × .26 =	$42,120
Depreciated	21,060

The annual charge for depreciation, based on the fifteen years of remaining life, would be $1,404.

The district at present is still one of apartments, but it is obvious that within 5 or 10 years the lots along the street will be improved with light manufacturing structures, rented to tenants on the square foot basis. Such buildings are now being constructed six to eight stories high within several blocks.

As far as can be seen at present the correct future building would be 50 x 100, 8 stories in height, freight and passenger elevator, mill construction, sprinkled, floor weights 150 pounds per square foot, having a total of about valuator estimates that this space would rent as follows:

1st floor and basement	$ 7,200
7 other floors	21,000
Total	$28,200

Reducing this amount 9% as an allowance for vacancies, rental losses, rental market fluctuations, etc., leaves an effective potential annual gross rental of $25,662.

He also estimates the operating expenses and other deductions which would obtain in such a building at about 22 cents per square foot of space:

$$45{,}000 \times .22 = \$9{,}900$$

A building of this character would cost about $3.10 per square foot of floor area to build:

$$45{,}000 \times 3.10 = \$139{,}500$$

There will be lump losses at the time of the erection of such a building which are estimated as follows:

Apartment rents	$2,500
Early vacancies	7,000
Interest	5,000
Miscellaneous	3,000
	$17,500

This type of building will probably be warranted in 5 to 10 years. Hence the valuator considers that the old building will last for about 7 more years, and that after that time the new building will be built. He then proceeds:

1. The present value of the future net income:

$$\delta\left(\frac{F}{\theta}\right) = (.665)\frac{(25{,}662 - 9{,}900 + 3{,}488)}{.07}$$
$$= \$116{,}603$$

2. The present effect of the costs involved in changing utility:

$$\delta\,(A + C) = (\ .665)\ (17{,}500 + 139{,}500)$$
$$= \$104{,}405$$

3. The value remaining in the old structure:

$$\delta\,\theta\,(P) = (5.917)\ (5480 - 1920 + 1404)$$
$$= \$12{,}757$$

4. The present value of the property:

Present value of the future net income....	$116,603
Value of the old building..................	12,757
	$129,360
Less cost of changing utility..............	104,405
Present value of the property........	$ 24,955

5. Distribution of the total value:

Present value of the property..............	$ 24,955
Value of the flat building..................	12,757
Value of the land.....................	$ 12,198

or about $244 per front foot.

IV. In the following example we appraise a commercial downtown hotel. Assume the site to be improved with a high-class hotel building, constructed in 1912. The evaluation procedure best used is the appraisal by corresponding typical use. The corroboration of the valuation requires, first, a reasonable proof that the use of the site for a hotel enterprise is not a lower utilization than any other possible use, and second, the computation of a net income by assuming the site to be occupied by a typical office building of about the same volume as the hotel. Assuming the first requirement to have been met, we go on with the computation elements.

It has been determined that the present value of an office building of the same volume as the hotel would be $2,600,000. This estimate is secured from an architect.

A careful study of current rental values obtained from actual data secured by investigation and analysis shows a potential gross annual rental as stores and offices of $644,000. This was determined by a study of the plans of the hotel building with hypothetical changes in laying out the first two floors, basement, etc., to determine a square foot area of rentable space.

Against this estimated gross income are certain deductions—operating expenses—194,575 square feet of rentable space at $1.25 per square foot = $243,219. It was found that the average operation costs of 23 office buildings in the city and of this class proved to be $1.23 per square foot of rentable space. This charge includes taxes, insurance and all items not provided for below.

As an allowance for vacancies, loss of rental, market fluctuations, a deduction of 7% is made from the gross rental estimate, leaving the effective gross rental at $598,920.

The amount of carrying charges during construction, such as ground rent, interest, architect's fees, etc., is the actual charge carried on the books of the hotel company, namely $206,000. This amount added to the estimated construction cost of the office building gives $2,806,000 as the amount of the investment which can be used to compute the depreciation. Using a flat rate of depreciation and assuming a remaining life of fifty years, the depreciation annually is $56,120.

Then the net income is found as follows:

Effective gross rental		$598,920
Operating costs annually	$243,219	
Depreciation annually	56,120	
Total deductions annually		299,339
Annual net rental income		$299,581

We deduct the value of the hypothetical building by assuming its structural value to earn 8% per annum:

$$2,600,000 \times .08 = \$208,000$$

and then 299,581 — 208,000 = $91,581, which latter amount is the annual return on the land and on the overhead charges which form part of the investment in the hotel building. The actual sound value of the hotel building less accrued depreciation is $3,000,000. If it earns 8% per annum, we have $240,000 per year to add to $91,581, or a total effective net income of $331,581 per annum. This capitalized at, say, 7% gives a total value of $4,736,871. Thus we are able to distribute the value:

Total property value....................	$4,736,871
Value of building.......................	3,206,000
Value of the land	$1,530,871

Note that the value ascribed to the land above includes the improved value increment.

Certain commercial properties are appraised without reference to their income-producing capacity. For example, railway depots, hospitals, clubs and such structures frequently cannot be analyzed in terms of rental income, and the processes applicable do not involve rental income. In these cases the summation process is usually resorted to, the value of the land being found by imagining a corresponding typical use, by comparison, etc., and the value of the building found by a study of its replacement cost and depreciation, or its suitability for general use or sale in a general market.

Very scientific and complicated methods of evaluation, such as have been described in this chapter, are, in general, not of very great use in the appraisal of most properties. It has already been pointed out that the finer measurements of value are only possible where properties are very valuable. That is, in very high value property the speculative elements of real estate value are not so important because of the established use of the land, and stable and sale values closely correspond. The zone of error will not be great. In real estate properties which do not have such definitely established utilities, speculative and market elements of value enter and precise measurement of value is more difficult, and in most cases does not produce a figure truly representing the fair cash market value. Hence the conclusion that appraisers should, in general, not attempt to apply the complex value analysis methods to any properties other than those of very high value and established utility.

Furthermore, the use of complex valuation methods is dependent upon a fund of experience data of great variety. Building costs, operating expenses, rent trends, and many other sorts of statistical information, which are, at present, in rather inadequate form for the use of appraisers, are needed, and as the fund of such classified data grows it can be used more fully in appraising real estate. However, the use of such statistical data will require a training in statistical method, and the practical personal experience of the appraiser will always constitute the background of appraisal method.

CHAPTER VIII

THE APPRAISAL OF RESIDENTIAL PROPERTY

By residential property is meant all urban real estate which is used for home purposes or real estate which might properly have been so improved. The appraisal processes applicable to homes and home sites are dependent upon the particular character of home involved. Hence it is important that a classification of residential properties be made and attention given to the appraisal processes which best apply in each classification. The classification made below will include most residential properties and will serve in the development of this chapter:

1.—Apartment and residential hotels.
2.—Multi-flat apartments.
3.—Duplexes and two-family dwellings.
4.—Individual family dwellings.
5.—Churches, schools, clubs, etc., in residential districts.
6.—Vacant sites suitable for residential use.

Consider each classification separately:

1. Apartment and Residential Hotels.—Hotels which are located in residential districts cannot usually be appraised in the same manner as commercial hotels. In appraising commercial hotels two processes were available—the analysis by corresponding typical use—and the sales percentage process. The first of these processes is not possible inasmuch as in a residential district there can be no typical use corresponding which would have as high an income producing value. The latter one—

the sales percentage process—might be possible of application to residential or apartment hotels provided sufficient data were at hand and the experiences of similar enterprises had been tabulated. But this will rarely be possible. The comparison process would be possible of application except that sales of similar property will be very few and will rarely be directly comparable. This leaves the inferential income process and the summation process as the only possible ones. Inasmuch as a considerable "improved value" increment can usually be presupposed to exist the summation process will be used only as a last resort, and usually a combination of the two processes will be used.

The valuator will first of all secure his data and then make an estimate of the net income produced by the real estate.

Having arrived at an amount representing the net annual return from the real estate the valuator will apply the regular method of appraisal by income analysis. He will, of course, use interest rates for capitalization selected on the basis of the degree of risk which such a use of capital entails and will also give considerable importance in such rates to the demand for residential hotel rooms and the competition between such hotels for residents and guests.

Usually this process should indicate a correct value, but in the cases of newer buildings, the appraiser would do well to check his estimate by resort to the summation process, giving the land a value based on the going value of similar sites which are vacant and giving the building its reproduction value less depreciation. These amounts added may not equal and will frequently be less than the total value derived from the income process. If less, the income process may be assumed to have given the correct value estimate. If, however, the summation process gives a value greater than the income process, the site is probably "over-improved" and is not the correct location for a residential hotel. The appraised value of the property is then made equal to the amount secured by the income process, but in the distribution of value between land and building the land is given the same value as that indicated by the recent transfer process, and the building is appraised as being the difference between the two, which amount will be less than the reproduction cost minus depreciation. There can obviously be no improved value. Improved value is derived from the services and good judgment of the promoter who placed the improvement on the site. In this latter case he made a mistake and his work does not carry a salable value.

Thus, in the valuation of apartment hotels, furnished kitchenette apartments, residential hotels, bachelor hotels, and all similar properties, the procedure which is used to determine the total value is the inferential income process, and the summation process is used as a check and for the purpose of determining upon the correct distribution of the total value between land and building.

To illustrate the foregoing, an example may be given. This example is put in the form of an appraisal report:

APPRAISAL REPORT

To: Mr. A. E. Ogden,
141 Hamilton Savings and Trust Building,
Omaha, Nebraska.

You have instructed us to determine the fair cash market value of the property described below as of the present date.

....

Legal Description.—Lot 2 of ....

....

The property has a west frontage on Grover Boulevard of 150 feet, a depth of 226 feet, and an alley in the rear 18 feet in width.

Improvements.—The property is improved with a six-story and English basement apartment building, constructed of reinforced concrete, and is fireproof. It contains 72 completely furnished apartments and kitchenettes (48 two-room apartments and 24 three-room apartments). Hotel and maid service are furnished the tenants. There are two electric elevators.

There is a large brick barn in the rear, which is used for garage purposes and occupied by the janitor.

Valuation.—A fair cash market value of this property is $635,000.

Certificate.—We, the undersigned, ...

(Signature.)

Supplementary Report

In determining the value of the property covered by this appraisal we have taken the rentals as given to us by the owner and renting manager and also have considered carefully the items of expense as furnished us. We have used our own judgment in estimating the costs and present below two analyses of the value, from which we determined the reported value of $635,000.

When a property of this character is improved permanently to its highest and best use, any appreciation in the land as distinct from the building is lost and the value of the property is determined during the period of its life by its rental power. In a property of this character there is no reason to believe that appreciation of the ground will equal depreciation of the building.

It will be noted in the analyses given below that we have changed the amount of the taxes from $5,400 as given us by the owner to $10,250, which is our estimate of that which is liable to be charged against the property in the future. There is a committee which was recently appointed by the Mayor to coöperate with the Board of Review with a definite aim to increase the taxes of properties that are under-valued. It is not reasonable to suppose that the Board of Review would pass a property of this value at $5,400. While the taxes may be levied for 1923 on this basis, it is not unlikely that they will be largely increased the next year. There are no special assessments levied against the property.

We have charged off as a portion of the expenses an item of $9,500 per annum as a replacement cost for furnishings. Our experience and research along these lines warrant us in using 10 years for a full replacement of such goods.

The item for decorations and repairs may seem low, but, in view of the fact that the walls and ceilings are painted, the item would necessarily be much less than usually obtains.

Our percentage for loss of rental due to vacancies is rather smaller than that which is usual, but the desirability of the property and the conveniences given to the tenants warrant the use of this figure.

The building is considered to have a life of 40 years.

Estimate of Value on a Rental Income Basis.—

Gross rent		$123,360
Expenses:		
Salaries	$11,800.00	
Insurance (fire rate $1.22 per M)	535.62	
Taxes (estimated)	10,250.00	
Laundry	1,500.00	
Water	240.00	
Gas	500.00	
Light and power	1,800.00	
Coal	5,400.00	
Decorations, repairs and supplies	5,000.00	
Agent	5,000.00	
Furniture replacement	9,500.00	
Loss and vacancies	7,041.00	
Total expenses		$58,567
Depreciation annually		12,000
Total deductions		$70,567
Net rental income		52,793
Capitalized at 8¼%		$639,927

which amount includes land, building and furniture.

Physical Valuation.—

Land 150 x 226 at $400 per front foot	$ 60,000
Building construction cost	490,000
Furniture	95,000
	$645,000

There is a possibility of adding to the rental income without an appreciable increase in overhead expense by providing and leasing garages in the rear of the lot. This would be accomplished by adding garages to the present barn or by building a row of new garages. If properly equipped, each of these should rent for $15 to $18 a month.

Another means of increasing the net return is to rent the space on either side of the main entrance of the building for a café and a drug store, at a rental of $150 to $200 per month each.

It was reported to us that there is a first mortgage with a balance due of $325,000, dated September 12, 1921, due September 12, 1931, at 7% interest. Annual payments are provided for, beginning with $12,000 the first year and increasing at the rate of $1,000 each year until the sixth. Thereafter an annual payment of $17,000 is provided.

During these serial payments an average annual payment would be produced of $14,500 and an average interest payment of $20,241.66, making a total payment required by the indebtedness of $34,741.66, which, deducted from the net rental as estimated above, $52,793, would leave $18,051.34 to be applied in the reduction of any second mortgage which may exist or as income to the owner.

In the above report the appraiser has computed values by both the income and the summation processes. The summation process gave a slightly higher amount, and he concludes that the site is slightly over-improved. Had the appraiser continued his analysis in distributing the value between land and building, he would give the land its value as indicated by the recent transfer process ($400 per front foot) and let the building value be the residue. Thus:

Total value by income process	$639,927
Less furnishings and furniture	95,000
Value of real estate	544,927
Value of the land	60,000
Value of the building	484,927

Should he wish to actually measure the extent to which the site is over-improved:

Building construction cost	$490,000
Value of the building	484,927
Over-improvment	5,073

or 1.05% of the value of the building.

This amount is entirely negligible and well within the zone of error of the appraisal processes. Hence there is no reference to over-improvement in the appraisal report. Had the amount been considerable, the client would have been informed in the report.

The rate of return secured from the property was assumed to be 8¼%. Granting this assumption, the rate of return from the land may be found by assuming fair rates of return upon the appraised values of the building and furniture. If we assume the building ($484,927) to earn 8.75% and the furniture ($95,000) to earn 8%:

Total net return		$52,793
Return on building	$42,431	
Return on furniture	7,600	
		50,031
Return on the land		$ 2,762

With the land appraised at $60,000 by the recent transfer process, a rate of return on the land of 4.6% is indicated. This does not mean that the land is necessarily worth less than $60,000, but that it is not improved at present to secure a full return on such a value. It might very well indicate that the recent transfer process of determining land value in this case has led to some error and that speculation in land has pushed land prices beyond actual earning capacity. This site is probably improved to its highest and best use and still a distribution of value between land and building cannot be easily made, or at least cannot be made in such a manner as to have much significance. This becomes, therefore, a striking example of the futility of appraising land and building separately when a reasonably permanent utility has been established.

There is still an analysis which should frequently be included in a report.

When the amount of actual outlay or investment in a new enterprise is known, the rate of return upon this amount should be shown in addition to the rate of return upon the appraised value.

In this case the actual investment was:

Land	$ 48,000
Building	490,000
Furniture	95,000
Investment	$633,000

The net return of $52,793 indicates a return on the investment of 8.34%. As opposed to many of the estimates to be included in the report, the above analysis is a fact of a very definite character, and may show the expediency of selling or keeping the property, and it should, therefore, be included.

2. *Multi-flat Apartment Properties.*—The typical apartment or tenement finds a market among investors. Therefore the correct procedure in appraising will be

capitalization of net income or the appraisal by income analysis (see Chapters V, VI, and VII).

The outstanding differences between the application of the process to apartments as compared with its use in the valuation of commercial properties are that the buildings have shorter lives, the rental income is liable to greater fluctuation, speculative booms and other market phenomena are vital value elements, and an insufficient or over-adequate building program in the community will be quickly reflected in the rental income. The net result of these factors is the use of higher capitalization rates in the valuation process and in provision for relatively rapid depreciation and obsolescence. The leases given to tenants in apartments are relatively short, resulting in a quicker adjustment to new rental levels.

As in the appraising of residential hotels, in the evaluation of apartments the appraiser does not rely entirely upon his income analysis but introduces check processes.

In a very few cases he may question whether the building is the correct development for the site. This he checks by the summation process. The ground is incorrectly improved if this process gives him a higher value than the income analysis. In this case, however, the incorrectness will usually prove to be that the building is too high in quality, not that a use other than for an apartment of some kind would be preferable.

In every case the appraiser makes check by using the comparison process, and it is through this study that he measures the degree to which market forces affect the value.

The process of evaluation called "multiple of gross rental process" should be mentioned in passing. This rapid estimate method is used by buyers and real estate salesmen. It corresponds to the British method of computing values as a constant multiple of the "Year's Purchase." The level and established condition of land utilization which it presupposes does not apply in American cities as yet—population is increasing too rapidly for its use as a reliable valuation process.

In the evaluation of apartments there is considerable discussion always given to the unique elements of value concerned with the site. The procedure outlined above assumes these elements to have already reflected themselves in the rentals which the tenants pay and the presence of an alley on the side, the fact of corner location, etc., are elements which are considered in determining the gross rental procurable. The practice of correcting total values derived, as in the comparison method for such unique value elements, without carrying them through the income analysis, may lead to error.

Extracts from an appraisal report covering an apartment building will bring out some of these points:

. . . .

Location.—The property is located at the Northeast corner of Graham Boulevard and East 10th Street, and is known as Nos. 1001-1005 Graham Boulevard. It has a frontage of 75 feet on Graham Boulevard and 150 feet on East 10th Street, and contains 11,250 square feet.

Improvement.—The lot is improved with a three-story brick building with terra cotta trimmings and glazed white brick in the areaway. The building practically covers the lot and contains three 9-room apartments and six 7-room apartments.

Income.—The property at present produces a gross income of $18,540 per annum. Deductions for operation, management, taxes, etc., are estimated as amounting to $8,120.28, indicating a net annual return of $10,419.72. Rents and expenses are computed on a basis of a five-year period.

Valuation.—In our opinion, the property has a fair cash market value of $112,000.

History.—Graham Boulevard was laid out as a very high-class residence street at about the time of the first migration of the wealthy classes from the West Side and, for those days, it became very valuable. This caused the erection of fine homes and it held this character for many years. This development was affected adversely by the same racial migration which was a contributing cause of the exodus from the West Side, and the property under this influence became less desirable. Apartments were built, still lowering its desirability for high-class residences. The apartments have, however, always brought the highest rents for the period, and the type of apartments has always been of the best.

The so-called "Aberdeen Park Improvement," a major part of which provides for the widening . . . has given the street a new impetus, and prices have notably risen and there have been many sales. A great deal of speculation seems in evidence. How far this influence will extend and what is the extent of its permanency are hard to determine. . . . In our opinion, the future of the street is in apartments and not business, for a great many years.

The Building.—It is an unusually well-built building, about twelve years old, and shows no sign of deterioration. It contains three 9-room and six 7-room apartments, with two and three baths, high-class plumbing, quarter-sawed oak floors, and is a very high-grade apartment structure. If built to-day it would be too expensive for the locality.

We find that to reconstruct this building at present prices the cost would approximate $173,000. Allowing for depreciation, its sound value to-day is $135,000. Were the lot vacant, its value would be about $22,500.

As insurance losses are adjusted on sound values of buildings, a line of $100,000 fire insurance would not be excessive.

The rentals taken from the records of the agents are:

Gross income		$18,540.00
Expenses (partly estimated):		
Janitor	$1,104.00	
Water	180.00	
Electricity	300.00	
Gas	60.00	
Garbage removal	78.00	
Decorating	1,200.00	
Coal	1,300.00	
Taxes (1923), payable before May 1, 1924	1,144.28	
Insurance: $100,000 fire per annum on 5 year premiums	208.00	
General liability	39.00	
	$5,613.28	
Allowance for vacancies, rental market fluctuations, etc.	1,080.00	
Allowance for permanent improvements, extraordinary repairs, special assessments and sundry expenses	500.00	
Agent's commission, 5%	972.00	
		8,120.28
Indicating a net annual return of		$10,419.72

From this report the appraiser's processes are fairly clear.

His principal process is the capitalization of net income. By this method he would arrive at a valuation of about $104,000, which amount he roughly adjusts for the market in which the apartment would be sold, and he reports a fair cash market value of $112,000. This latter amount he has somewhat checked in all probability by the comparison process.

He does not report separate values for the land and building, evidently considering the property as an entity and not as encumbered land. This is quite correct. He might have proceeded by the summation process to measure the degree to which the site is over-improved:

Reproduction building value depreciated	$135,000
Value of the land as vacant property	22,500
Total value of the property by summation	157,500
Fair cash market value of property	112,000
Estimate of extent of over-improvement	45,500

The summation process would also indicate that the building "contributed" $89,500 of value to the value of the ground.

3. Duplexes and Two-Family Dwellings.—The typical duplex might be valued in exactly the same method as an apartment property. The procedure would not lead to any serious error. Nevertheless, it is generally felt, because of the fact that the duplex or two-family dwelling frequently is occupied by the owner himself and a tenant, that the direct capitalization of net income (found in this case, of course, by the inferential income process) leaves out of consideration the home-owning value such an arrangement includes. The two-family dwelling in such cases is not sold in a market of investors who are primarily interested in an annual return. The purchasers of duplexes are actuated by other motives.

The appraiser's method, to be correct procedure, must correspond to the market motives of purchasers, and in this particular type of property a preferable procedure would be the summation process and the comparison process combined. If any improved value exists at all in such properties, it is quantitatively negligible. Where an appraiser might be tempted to use the inferential income process, he would do well to ascertain whether the real estate market in which the particular duplex would probably be sold contains a larger proportion of investors or home-seekers, and select his process accordingly.

4. Individual Family Dwellings.—Individual family homes are appraised by the comparison process. Rented houses are no longer common in the United States, and in general the occupants of homes are likewise the owners. The amounts which they will pay for their homes are determined by the costs of building construction, the level of salaries and wages, the level of apartment rents, the number of home-seekers, the supply of houses for sale, and the desirability of the neighborhood. The relative importance of these elements is purely speculative, and the reduction of home evaluation to precise method is not practicable. Hence, the appraiser must weigh all of such factors as abstract considerations and he can approach the cumulative importance of them by observing their effect upon the actual sales of similar properties. That is, the only tangible method or procedure in the measurement of home value is contact with the immediate real estate market for homes and a general knowledge of the amounts which properties have been bringing in sales.

The comparison process when applied to individual family dwellings consists of the collection of facts concerning all recent sales of homes in the district. Each transfer is compared with the property in question and a value is given to the property based upon its points of superiority or inferiority. No attempt is made to deliberately study and measure each element of value. Instead, the valuator contents himself with listing the "points" which the house and location have, and comparing them with the effect which similar "points" have had in recent sales of other properties. His attention is directed upon the home as an entity and its desirability as a home, its newness, its prettiness, the neighbors, the district; and all such unmeasurable elements are considered in terms of the home as a whole.

The popular demand is for the building plot which has frontage on its southerly side. Such a demand is usually coupled with a desire that the main living-rooms be in front. In any event, they should have south exposure when possible. The design of the house is paramount and darkness, wasted space, poor arrangements, and obsolete layouts operate against value. Convenience of movement in the house, considered from every angle of living, will be studied, and distances, steps up or down, door and window positions, adaptability to ordinary furnishing, closet shapes, sizes, and number, directions of exposure and all other interior architectural features will be given weight.

Obviously such elements will include general reference to the age of the house, type of construction, materials, and state of preservation and repair. A valuator will not confine himself in his inspection of a house to the "livable" elements alone. He will want to know the adequacy and permanence of the heating plant, the condition of the foundation work, the roof, and he may even consider the costs necessary to put the house into good condition by cement work, painting, installing new screens and awnings, interior decorating, re-roofing, and even radical changes in layout or additions of rooms. In his final valuation in such cases he might report a value for the property as it is, and also an estimate of the price obtainable after such repairs and remodeling. It is a very common occurrence for a house to sell at an increased amount under such circumstances greatly in excess of the actual costs involved in the alterations and repairs.

The valuator also gives some consideration to the relation between the house and the lot. A very small house on a very large lot may present an actual case of under-improvement and, conversely, a very large house upon a site inadequate in area is probably rarely salable at quite as high a price. The position of the house on the lot is a similar factor.

There are styles in homes, particularly in the West. The day of the huge granite palace has about passed, and there are few purchasers of homes who desire more space than the minimum required for convenience and comfort. The satiety of vanity by grandeur is no longer common, and small homes which are simple and pretty have greater appeal. Thus it is found in appraising that very large houses frequently are not worth their structural values and that small houses may have values somewhat in excess of their structural values, although no great amount of improved value will exist in most cases.

The exterior effect of the house and lot seems to have an influence on purchasers that is somewhat out of proportion. The soil, trees, shrubs, lawn, and garden will all contribute to the valuation. Pretty fences, hedges, and arbors are relatively uncostly features which seem to radically increase salability.

Then there are other factors, such as view, exposure, garage, alley paving, the street improvements, etc.—all of which make a house more or less desirable.

The general neighborhood elements of value—those having to do with the people, religion, race, standards of living, community interest and civic enterprise, density of population, parks, churches, clubs, schools, etc.—are generally not studied to any great amount in the evaluation of individual family dwellings, unless there is an apparent tendency for the district to change in character. Any menace or any promise of improvement affects value, but in general the neighborhood elements are considered as having been reflected in the prices of the properties recently sold in the district, and the comparison process of evaluation does not therefore require that great attention be given to general neighborhood

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Appraised by the Comparison Process

elements except to ascertain any tendency for a change in the neighborhood character.

In the comparison of the house with houses in the district which have been sold, the distances to stores, merchants, and to transportation should be considered and inferiority or superiority in this respect given some weight.

Homes in districts other than established home districts are rarely valued by the direct comparison process. In such cases the ground will likely have a value which is independent of the house, and the ground value will constitute part of the total value of the property without reference to the present utility. These properties are thus appraised by the summation process, the land value being that indicated by the recent transfer process, capitalization of net income and separation process, appraisal by income analysis and separation process depending upon the level of value and the utilities in the district. The building value can be found by the price comparison process, if there are other similar obsolescent houses in the district, the multiple of rent process, if there is a tenant, by the annuity for life process if there is a tenant, or given no value whatsoever in the total valuation when the land is truly valuable, and the house entirely out of place. Hence, the common practice among many appraisers of giving no value to houses in apartment districts, when the houses are very old, and where the ground has great value derived from the possible erection of apartments on it.

Comparative value analysis methods (see Chapter XII) to secure estimates of the value of land on which are homes are applicable, but are of very little actual assistance. Market influences are present to such a degree and introduce such variations in the prices of homes that comparative value analysis is usually not worth the trouble which it involves. Comparative value systems have frequently been suggested as checks upon judgment in such cases. These methods are certainly not checks, and no reliance should be placed on them whatsoever in residence districts by the general appraiser. The tax assessor, on the other hand, will generally find them useful and applicable.

5. *Churches, Schools, Clubs, etc.*—Buildings such as churches, schools, etc., are appraised by the summation process. When located in residential districts, the values attributed to the land are found by the recent transfer process. There is no "improved value" accruing to the land.

The values of such buildings are found usually by the reproduction cost method, and in such cases the appraiser must justify the utility for the location. The fact that there is no general market for such buildings should be reported, indicating that the value estimate is of the stable value of the building to the owners and not one realizable in a sale. The placing of a sale value on such structures is practically impossible. If by remodeling the building could be changed to some more typical use which the district warranted, an approach might be made to an estimate of value in a sale. In residential districts this is only possible in exceptional cases. Churches are sold, however. Clubs are remodeled into hotels at times. So there are cases where sale values are justified in the appraisal report, but no generalities as to procedure seem possible.

6. *Vacant Sites Suitable for Residential Use.*—In the evaluation of vacant land in established residential districts the most generally applicable method is the recent transfer process.

In general, the only requirement made is that the appraiser be familiar with the going prices of land and that he make an estimate of the price procurable by adjusting the going prices for points of superiority or inferiority in the particular site.

The determination of the correct utilization of each vacant site should invariably be a part of his report. To arrive at a conclusion that the land should be improved by an apartment building, or by duplexes, is not sufficient, and usually such a conclusion does not require much study on the valuator's part. Instead, the report should indicate a preferable type of structure. That is, the amount of money warranted in developing the site should be stated and the quality of the building specified. Slight over-improvement or under-improvement is frequently unavoidable, but the skilled appraiser can, by comparison, give a very practical analysis to show precisely why structures of a particular kind should be built in preference to some other kind.

The zoning restrictions which have been established in many cities make a general determination of correct utility, and it is within these limitations that the appraiser works in deciding more definitely and precisely upon a correct improvement to recommend to the property owner. In such a study the attempt should be made to find which type of development will produce the maximum amount of improved value. It is that particular utility which will prove to be exactly the correct development. In some cases, where the lot is entirely unique, a value element which is called by some "monopoly value" enters and the development or improvement recommended should always correspond to and preserve this increment of value when it exists. Monopoly value might be defined as that increment of value which a site possesses when it is so located or has such characteristics that no other site in the district could be used for the same utility after the particular utility had been introduced on the lot.

When appraising vacant residential property it is sometimes of assistance to introduce the use of comparative value analysis systems (see Chapter XII), although in general the application of these systems will be somewhat limited except in tax assessing.

Where properties are of high value in a residential district the process of evaluation by recent transfers would give way to an analysis of ground value through the agency of a future building. This would be the process of comparison and separation. The evaluator would decide upon the development for the site which would represent its highest and best use. He would discover by comparison the amount which would represent the total value of the property after such development had been completed. From this total he would then make two deductions to arrive at the present ground value. He would deduct the value of the building (found by the cost of construction process) and then he would deduct an amount representing improved value. He may obtain the amount of this latter deduction by a study of the increment produced in similar properties in the neighborhood. If there is great question as to just what development does constitute highest and best use, the deduction for the improved value increment will be relatively large. If the selection of highest and best use is relatively easy, the property will not produce as much improved value.

When property values are very high, the appraiser might prefer in some cases to use the process of capitalization of net income and separation, again deducting the building value and the improved value increment.

CHAPTER IX

THE APPRAISAL OF FARM PROPERTY

The principles which govern appraisal procedure in the evaluation of agricultural real estate are not different from those which are utilized in urban appraising. The elements of value which enter as data, are, however, very distinctive and difficult of reduction to measurable terms.[1]

In arriving at a correct appraisal it is not sufficient that the valuator study the going prices paid for farms in the vicinity, and adjust the average values thus secured for elements of superiority or inferiority in the farm in question. Farm prices have been subject in the past to violent fluctuation. The prices of farms in 1919 and 1920 rose far beyond the level warranted by productivity, and the use of current farm sale prices as criteria of value led to incorrect valuations. During booms farms sell for a great deal more than they are worth, and during times of depression they sell far below their true long-time values. This does not mean that an appraiser would not be justified in reporting his opinion as to the amount a farm might bring under any particular market condition, but it does mean that he should report a fair long-time value and that he cannot use current farm prices in arriving at such an estimate. Thus appraisal by the use of the recent transfer process is not applicable in the evaluation of farm properties.

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[1] Much of the material comprising this chapter has been adapted from a pamphlet by Ernest M. Fisher, published in the proceedings of the Farm Lands Division of the National Association of Real Estate Boards, 1923.

One very fundamental distinction should be introduced in the procedure, namely, the distinction between the farm as a production plant and the farm as a home. The farm performs both functions, and the values of farms and the procedure in the evaluation of farms must reflect this distinction.

The value elements which enter into farm values are complex. The reputation of the community, the nationalities of neighbors, the degree to which settlers have been attracted by advertising, local spirit, and opportunities for amusement become quite as important factors as fertility. All factors of value require analysis and study in farm appraising and it will be evident that the real need of farm valuators to-day is a fund of data from which can be constructed generalities as to farm experience and the relative importance of the value factors.

The Farm as a Production Plant

As a production plant the farm derives its value from what it will produce; from the income which the owner can realize from the products, and the living he secures for himself and his family. From the income from the sale of products he must meet his expenses of production and realize whatever profit he receives from the farm. The expenses of production deducted from the gross income from the sale of products gives the net income of the farm, and the long-time value of the production plant phase of the farm is a function of the net income.

The amount of net income is affected by such a variety of forces that it is virtually impossible to discover in many cases for any particular farm. This is an unfortunate condition which makes the use of income impracticable in most instances of farm evaluation. Nevertheless, some farm properties can be appraised by the discovery of a normal figure representing average annual net income, and whenever such a figure can be fairly reliably computed, the production plant is appraised by the capitalization of the net income. In other cases, however,—most of the cases—resort to other methods of approach will be necessary.

The production possibilities are so much affected by personal management and the character of farming and other somewhat variable circumstances that few instances of approximately accurate amounts for net income will be possible. The land should be divided in accordance with the different uses for which it is suited. Naturally that farm is most desirable which contains land devoted to various types of products, and in the most expedient proportions. There should probably be grain fields, pasture, a wood-lot, truck patches, chicken yards, hog pens, and orchard. The actual proportions of these various kinds of production vary from community to community. The proportion devoted to grain production in Manitoba will be very large, and that devoted to orchard will be large in the fruit regions. The correct proportions, or at least the most desirable proportions in any particular region can be determined. Most farm appraisers have genuinely accurate opinions for their own territories. A comprehensive study which is being conducted by the Bureau of Agricultural Economics will undoubtedly give us a great deal of information covering this particular question.

Assuming the distribution of the land of the farm to the proper uses and in the correct or most desirable proportions, the productivity of each of the parts is determined. Production is measured in terms of bushels per acre, etc., and cost factors in terms of direct production costs and marketing costs. The latter group of costs enter very directly in the appraisal of farms. They are the measures of location and access.

If the farmer must haul his product long distances to market, his costs cut down his profits. An examination of sales records over a period of years in one county in Minnesota indicated that immediate access to a macadam road added an average of $21.95 an acre to the values of farms. There are to-day quite a number of farmers living on pavings who have not had a draught horse through their front gates for years, and who haul all the produce and stock that can be raised on cheap motor trucks.

The buildings and improvements on a farm, with the exception of the house and home improvements, are a part of the production plant. A farm may be over-built, or inadequately built. Or the improvements may, or may not, be adapted to the land. Barns, silos, wells, fences, houses for labor, stables, dairies, and so on, are the necessary accompaniments of the use of the ground for production and they become important value factors in the appraisal, particular weight being given to their adaptability to the land.

If buildings and improvements are properly adapted to the farm, they are made, in the appraisal procedure, to be worth their reproduction costs minus depreciation. When not adapted, or when the farm is over-built, buildings are valued on the basis of the degree to which they serve in production and their construction costs are not considered. In other words, the presence of obsolescence diminishes their values below a value represented by cost of replacement, less structural depreciation. The extent of obsolescence can sometimes actually be measured by estimating the cost which would be involved in changing the existing buildings or improvements to the correct ones by alteration or remodeling.

To the value of the farm as a production plant must be added the value of the farm as a home.

THE FARM AS A HOME

If a farm consisted of no more than the production plant, a system of accounting from which experience records were built might ultimately result in the creation of a scientific method of farm appraising. But there is no accounting system which can show the weight of the home element and the amount of value attributed to a farm because of its home function can only be measured by market comparison of some sort. The values of farms are higher than the amount of net income alone would indicate because they include the additional home value factor.

A part of the home value is attributable to the economic independence of farmers. There is no other producer who has this assurance. He is his own master and usually enjoys much leisure during certain seasons of the year. Then there is the thrill of the great out-of-doors, a very genuine element in the creation of a farm home value.

Ownership of land may be considered as the most fundamental form of property right and land itself is an attractive investment for this reason. It appeals as being the safest of all forms of investment. This, coupled with a comparatively low cost of living in rural communities, gives the farmer a feeling of security which may be most certainly considered an element of farm home value. People like to own land, and its attractiveness is not confined to the productivity of the soil.

The ordinary market factors of value, mentioned in Chapter II, cause higher values for farms than that indicated by productivity. A speculative wave may influence purchasers to pay higher prices very frequently. Land values in the United States have steadily increased since the first breaking of the land. There has actually come to be a reliance upon the certainty of a continuing rise, and this generally recognized confidence adds greatly to farm values in the long run.

To-day farmers are no longer content to accept the former low standards of living. They invest the profits of the production plant in the farm home. Electric lighting plants, landscape gardening, plumbing systems, and an appreciation for architectural beauty in home buildings mark the farm home of to-day. Such outlays of capital may, and usually do, increase the values of farms, but only in the same way that similar betterments would increase the value of the suburban home of an urban business man.

The Possible Appraisal Processes

The value of the farm as a home cannot possibly be reduced to any scientific method, and the value of a farm as a production plant introduces so many variable elements that it is unlikely that any analysis of income will go far in providing an appraisal procedure. As a result, the preferable appraisal processes for use in the evaluation of farm property will be based upon comparison. It is certain that the land values will be estimated primarily by a process of comparison.

The prices obtained over a period of fifteen or twenty years in a community will give an accurate index of the general levels of values in that community and will indicate whether those prices are constantly increasing or decreasing.

That is, the general long-time trend of farm prices in the community can be discovered by reference to farm sales over such a considerable period. On the other hand, the use of recent transfers alone and reliance upon them is more than likely to lead to serious error. As has been indicated before, there is an obvious great fluctuation in farm prices, particularly during periods of exceptional inflation or depression. The trend of values over a long period should be studied and projected into the future by the appraiser. Having secured a land value by the long-time transfer process, the quantity thus secured may be adjusted to make an allowance for the expected future income from the property. The appraiser should be familiar with the trend of prices paid for farm products. There is a relationship between these prices and the prices paid for farms. The prices paid for farms must reflect in a great many cases the farmer's estimate of what he can earn from it. Income can never be earned if the prices he receives from his products are not consistent with the price paid for the farm. His present value of the farm, then, is based to some degree upon his forecast of what prices his products will bring him in the market. If these prices are going to fall, he will be obliged to cut down the amount he will pay now for the farm or take a loss later.

Again, current prices of farm products are as unreliable as current farm prices. The long-time course of prices must be studied. By such a method—projecting the trend of prices paid for farms in the community and the prices paid for agricultural products—the general level for the community is established. A specific farm may then be appraised as varying either up or down from this general level. Perhaps the first adjustment made in varying the estimate up or down from the general level for a specific farm is to make allowance for topography, soil, and the stage of cultivation. The best appraisal practice divides the farm up into its component parts in accordance with their physical appearance and uses.

Timber lands which are of the same quality as cultivated land and lying equally well may be worth considerably less or more than land under cultivation, depending upon the value of the timber and the cost of clearing tree stumps and roots and the cost of putting it under cultivation.

Land which is in meadow or pasture lying equally as well as land under cultivation and having an equal degree of fertility should be appraised at the same level as land actually in cultivation which may be producing more income. The cost of converting the best grass lands into corn land is nil, and it is even more fertile.

Enough has been said to indicate the general outline of procedure in appraising farm lands. With a record of average prices paid in the community over a period of years and a record of prices paid for agricultural products, the appraiser has the most reliable indices of the value of the farm. These indices establish the general community value of farm lands in the neighborhood. The community for which such a general level is established must be small in every case. The smaller the community, the more accurate can the appraisal be. With such a fixed average for farm lands in the community, the particular farm must be appraised as varying from the community level and being worth more or less according to whether it measures up or down from the general standing, when the factors here set forth have been considered.

Ratios and proportions of land devoted to particular uses on any given farm will vary in different communities. The most desirable ratios probably vary so much from community to community that standards would be very difficult to set.

The values of the buildings and other physical improvements of the farm are appraised at their structural values, provided they are adapted to the land. Otherwise the buildings are given values which indicate their importance to the farm. For illustration: All of the buildings which would be included properly as a part of the production plant, the barns, silos, cribs, houses for labor, pens, hay sheds, etc., if necessary and required in the operation of the farm and if adequate for its proper operation, are valued at their reproduction costs minus depreciation. If, however, any of these buildings are larger than is necessary or are built in a fashion which is too expensive to be warranted by the land, such excess value is a form of over-improvement and cannot properly be included as a part of the value of the farm. The farm house can be given a value, in most cases, equal only to the reproduction cost less depreciation of a reasonable farm house for the community. Exceptionally costly houses or large houses are not to be valued at their full reproduction levels, and an excess of home improvements of a costly nature may not add greatly to the value of the farm.

Farm Appraisal Procedure

The bases upon which farm appraisal procedure rests have been indicated. The appraiser secures a general community land value by the long-time transfer process.

STATE OF CULTIVATION

Topography	Cultivated (to include alfalfa and not tame hay)	Tillable (but not in cultivation)		Not Tillable	Soils Note: State color—black, brown chocolate, red or gray, and whether it is of a waxy, loamy, sandy or gravelly nature. Also give nature of the subsoil:
Upland. . . Acres	. . . . . Acres Level. . . . . A Undulating. . . . A Hilly. . . . . A	. . . . Acres Level. . . . . A Undulating. . . . A Hilly. . . . . A	. . . . Acres Tame hay. . . . . . . A Native grass. . . . . A Pasture. . . . . A Timber. . . . . A	. . . . Acres Rough or broken. A Stony. . . . . A Low or Wet. . . . . A Creek. . . . . A	
Slope. . . . . Acres	. . . Acres Level. . . . . A Undulating. . . . A Hilly. . . . . A	. . . . Acres Level. . . . . A Undulating. . . . A Hilly. . . . . A	. . . . Acres Tame hay. . . . . . . A Native grass. . . . . A Pasture. . . . . A Timber. . . . . A	. . . . Acres Rough or broken. A Stony. . . . . A Low or Wet. . . . . A Creek. . . . . A	
Valley. . . . Acres	. . . . Acres Level. . . . . A Undulating. . . . A	. . . Acres Level. . . . . A Undulating. . . . A	. . . . Acres Tame hay. . . . . . . A Native grass. . . . A Pasture. . . . . A Timber . . . A	. . . . Acres Rough or broken. A Stony. . . . . A Low or Wet. . . . . A Creek . . . . A	
Bottom. . . Acres 1st Bottom. . . A 2nd Bottom. . A	. . . . Acres Level. . . . . A Undulating. . . . A	. . . . Acres Level. . . . . A Undulating. . . A	. . . . Acres Tame hay. . . . . . . A Native grass. . . . . A Pasture. . . . . A Timber. . . . . A	. . . . Acres Rough or broken. . A Stony. . . . . A Low or Wet. . . . . A Creek. . . . . A	
Totals Acres	Acres	Acres	Acres	Acres	

He makes a tour of inspection of the farm, mapping it and discovering the distribution of the various uses of the land. The accompanying plate illustrates a questionnaire which he can use on such a tour.

The most difficult remaining task is to determine what relative weight to give to the various elements which have been set forth as entering into the value of the farm. This is a point which needs much thought and analysis on the part of appraisers throughout the country. One company divides the elements of value in the farm into ten equal divisions and assigns to each of these divisions 10 per cent of the total value of the farm.

The divisions are:

1. Location of property.
2. Accessibility and transportation.
3. Character of improvements.
4. Rental value.
5. The adaptability for certain purposes.
6. Neighborhood improvements.
7. Population and neighborhood tendencies.
8. Topographical conditions.
9. Marketability and value as collateral.
10. Comparison.

Each farm is rated on each of these divisions, 10 per cent representing the highest valuation of the community in each case. In the first division, for example, if the farm enjoys most exceptional and excellent location, it would receive 10 per cent. If the improvements, however, were not satisfactory, it might receive only 4 per cent on that division. After each division has been rated, the total is found, which may be, for example, in the case of any particular farm, 80 per cent. The standard for the community is then applied and the valuation assigned to the farm in 80 per cent of the standard community value. Another company makes only four divisions, assigning different percentages to each division and subdividing the divisions in accordance with the following scheme:

SCORE CARD FOR FARMS[1]

- I. Agricultural Productivity 40%
  - A. Natural Fertility of the Soil.................. 12%
    - 1. Determined by its color, depth and growing crops.
  - B. Area in Crops.............................. 12%
    - 1. How much not in crops could be put in? Cost to do so?
    - 2. What can non-tillable land be used for?
    - 3. Are fields irregularly shaped on account of draws?
  - C. Topography 6%
    - 1. Should slope enough to drain well, but not enough to wash.
    - 2. Terraced? Condition of terrace?
  - D. Drainage 6%
    - 1. Porous soil, no hard pan.
    - 2. Ditches: open, tile, outlet, condition.
    - 3. Overflow: Head water or back water.
    - 4. Levees and levee taxes.
  - E. Adaptability to Type of Farming............. 4%
    - 1. Is soil same as neighborhood?
- II. History and Condition.............................. 20%
  - A. History 10%
    - 1. How many tenants during the last fifteen years? Why?
    - 2. Has farm been a trading proposition?
  - B. Condition 10%
    - 1. Good state of tilth or run down?
    - 2. Rotation practiced? Organic matter returned?
    - 3. Commercial fertilizer used? Why?
    - 4. Is there a good garden and orchard?

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[1] Score card used by American Central Life Insurance Co. of Indianapolis, applied only to better improved farms in Indiana, Illinois, Ohio, Iowa, etc. A score card for the newer sections of the country, such as Oklahoma, western Kansas, Texas, and Arkansas would be different—more stress being placed on community value.

III. Community Value 25%
  A. Neighbors 6%
  1. Progressive. Good farms and farmers?
  B. Roads 8%
    1. Kind and condition.
    2. Main highway or neighborhood road?
  C. Markets 5%
    1. Distance from farm to market?
    2. Size of market town industries, banks, railroads, etc.
  D. School and Church.................................... 4%
    1. Distance from?
    2. Consolidated school and high school?
  E. Health of Neighborhood.................................... 2%
IV. Improvements 15%
  A. House 5%
    1. Size, foundation, roof, flues, cellar, convenience, condition.
  B. Barn 5%
    1. Size, frame, foundation, roof, granary, hay fork, number of stalls, condition.
  C. Other Buildings 3%
    1. Machine shed, hog house, poultry house, etc.
  D. Fences 2%
    1. Kind and condition of fences and gates.

The objection which may be raised to both of these cards is that they assign weights that apparently are arbitrary. A large amount of investigation in each community, based upon a correlation of known existing conditions, with prices actually paid, would enable accurate weights to be determined.

A great step forward will be taken in the appraisal of farm lands when the value of these various factors has been established for the different sections. A much more scientific basis will have been reached. Nevertheless, the element of judgment will always enter into the appraisal of a farm.

CHAPTER X

DEPRECIATION AND OBSOLESCENCE

In all forms of income-producing realty the criterion of value was found in an analysis of the net income. Net income was defined as the yearly return remaining after all deductions from gross rental had been made, including operating expenses, taxes, and depreciation. The processes suggested in every case assumed the building to be a perpetuity and the justification for the assumption was found in the creation of a depreciation reserve to repeatedly replace the improvements. If net income is to be used in computing the value of property, the accuracy of the methods will require a very adequate provision for depreciation and obsolescence; and the belief that depreciation and obsolescence are relatively unimportant factors is fallacious.

Without an adequate deduction from gross income for depreciation and obsolescence, false profits appear, which, if capitalized in finding the value of the property, lead to false values. The amount of depreciation and obsolescence is necessarily a difficult quantity to estimate with any degree of accuracy, but its omission or under-estimation results in fictitious evaluation of true property values.

Depreciation may be defined as being a steady and inevitable destruction, due to wear, tear, and decay. It is the gradual physical decay of building improvements resulting from the action of weather, time, and actual use.

Obsolescence is defined as a reduction in value of physical improvements caused by factors which cannot be controlled or retarded. When property value is diminished because of changes in the district, changes in style and layout of buildings, changes in character of fixtures, or by the loss of light and air due to the erection of adjacent buildings, obsolescence is present.

The Problem.—In the treatment of the problem in the evaluation of real estate, a difference in point of view between the appraiser and the accountant is apparent. The appraiser is concerned with the estimation of the market value of property, while the accountant is concerned primarily with the proper provision for the replacement of capital assets. The appraiser is not concerned with the actual investments of capital which may have occurred, but must estimate a market value for the building, while the replacement of investments actually made, out of yearly profits, constitutes the primary consideration of the accountant.

Thus the real estate appraiser, in caring for depreciation and obsolescence, finds himself confronted with two phrases of the problem: First, he finds it necessary to determine the sale value of buildings, without regard for their original costs or ages, but with due regard for their condition and adequacy. Secondly, he finds that his appraisal methods assume the permanence of the value at which he has arrived and that continuous replacement of the present building value from the income must be provided for in computing the net income figure which he uses. He has then two items, or quantities, to compute in each case: (1) The amount of accrued depreciation and obsolescence, and (2) the annual depreciation and obsolescence charge to take from gross income in order to justify his processes which assume the building as a perpetuity.

In finding the amount of accrued depreciation, he uses the point of view of the real estate appraiser, and the quantity used is the result of a study and inspection of the physical condition and adequacy of the structure as it stands, with no reference to its age or its original cost. In computing the correct quantity to use as the annual depreciation and obsolescence charge to take from gross income for each succeeding year in order to replace the present-day structural value, he utilizes the principles of the accountant and usually concerns himself with some sort of an estimate of years of remaining useful life in the structure.

ACCRUED DEPRECIATION

Accrued depreciation is the difference between the cost of reproducing the building new and its present-day value. It may be calculated in several ways:

1. Value of the Asset from Its Income.—The actual amount of accrued depreciation and obsolescence is computed by this process in which the income from the property is analyzed and the value of the building found and deducted from its reproduction value, the difference being the amount of accrued depreciation and obsolescence.

The essential steps in the process can be indicated by an illustration. Assume an old building which is producing an annual gross income of $39,000. The appraiser first makes an estimate of the value of the ground as such as though it were vacant and ascribes a value to it. In this case he finds its value by comparison to be $100,000. He then selects from the operating statements of the building the typical annual expense items and finds that all operating expenses, taxes, and other deductions, without including interest or depreciation and obsolescence, amount to $18,000 per year. Making the assumption that a fair return on the value of the land is 5 per cent, or $5,000, he is able to show that there is $16,000 per year remaining after the above deductions and a fair return on the ground value have been paid:

Gross income		$39,000
Return on land	$ 5,000	
Expenses, taxes	18,000	
		23,000
Residue		$16,000

This residue is the return on the building without reduction allowance for depreciation and obsolescence. The annual charge for depreciation and obsolescence under this method requires an estimate of remaining useful life of the structure and an estimate of the cost of reproducing the building. If in this case the remaining useful life of the structure is estimated at twenty years (purely a guess on the evaluator's part) and the cost of reproducing the structure is estimated at $200,000, the direct amortization of the building structural value within the twenty years requires an annual charge of $10,000. Thus:

The residue	$16,000 yearly
Amortization	10,000 yearly
Interest on building	$ 6,000 yearly

The $6,000 is the clear return on the building, and the value of the building is then found directly by capitalizing. If a fair return on building values is 8 per cent, then the value of this building would be $6,000 divided by .08, or $75,000.

The total accrued depreciation and obsolescence is then found by taking the difference between the reproduction value of the building and its market value as found above:

Reproduction value of building	$200,000
Market value of building	75,000
Accrued depreciation and obsolescence	$125,000

The total value of such a property is found by summation, inasmuch as no improved value exists:

Value of the building	$ 75,000
Value of the land	100,000
Value of the property	$175,000

This method of computing accrued depreciation can be used only as a check process and is somewhat crude because of the violent effect various assumptions of remaining useful life will have. In income property, however, it is desirable to compute accrued depreciation and obsolescence in this manner as a check against the other processes. At best the estimate of remaining useful life is but a guess and no very reliable figure for accrued depreciation and obsolescence is derived by it.

As a refinement, this method can be expanded by a comparison between the rents obtainable were the building new and the actual rents obtainable. The difference in rents capitalized should usually approximate a figure very closely related to accrued depreciation and obsolescence.

2. *Price Comparison Process.*—The evaluator in applying the price comparison process deducts the value of the land from the total sale prices of properties in the district, and finds thereby the prices ostensibly paid for the buildings in recent transfers of real estate. He selects buildings for the purpose in which physical destruction has taken place to about the same extent as in the structure he is appraising. In this way he attempts to introduce a "buyer's estimate of depreciation," a method which is not applicable because of its impracticability.

Comparisons of this character, if made carefully, and with due regard for the effects of various kinds of occupancy, would do a great deal toward the development of actual data to indicate the effects of wear, tear and district changes upon the market prices of buildings as time elapses. Such research studies are possible and should prove very fruitful. Nevertheless, the method, when applied to specific sites at present, will not render results of any particular significance.

3. Reproduction Cost Less Depcciation.—One very commonly used method of computing accrued depreciation and obsolescence is to assume that the destruction in value of a building due to depreciation and obsolescence is a constant or flat percentage of its reproduction value each year. Thus the amount of accrued depreciation and obsolescence in a building which would cost $500,000 to replace new, and of a type which appraisers would habitually reduce in value at a rate of 2½ per cent per annum, would be found by multiplying the reproduction cost by the depreciation rate, and multiplying the result by the age of the building in years. Thus if the above building were eight years old the amount of accrued depreciation and obsolescence by this method would equal $100,000.

This method corresponds very closely with the methods used by accountants except that the reproduction value rather than the original investment in the building is used. The process is simple, direct and has merit, but it is open to certain errors which should not be permitted to enter into final appraisal reports.

To assume that the actual age of a structure has any appreciable effect upon the market value of a building is an error. That it is old, very old, or fairly modern, etc., may have a bearing, but that it is exactly eight years old is not a very great factor in market value. Experience does indicate, however, that depreciation alone does operate with some uniformity and regularity corresponding to the period of time which has elapsed, particularly when the occupancy has been typical and no extraordinary factors affecting the rate of physical destruction have been operative. Thus an appraiser may use this method to calculate an amount representative of accrued depreciation, securing the rate of depreciation from experience data, much of which has accumulated during the last few years.

By this method accrued depreciation estimates can be made and an additional sum to represent accrued obsolescence secured in some other manner.

4. Direct Estimation.—Perhaps the most logical method in obtaining the present values of older buildings or of finding the amount of accrued depreciation and obsolescence is to directly estimate the quantity, basing the estimate upon the actual physical condition of the premises as revealed by minute inspection, and the adequacy of the structure in its relation to the district and location. This is precisely the line of reasoning usually adopted by a purchaser and in most typical properties with considerable remaining useful life will produce an estimate more accurate than any other.

In practice, however, an evaluator usually does not care to adopt such a direct method without some device for checking his judgment. He is, therefore, inclined to estimate the amount of accrued depreciation by the reproduction cost less depreciation method described above and to rely upon his own judgment as to the amount of accrued obsolescence to allow.

In a direct estimation of accrued obsolescence the factors considered are difficult of measurement. New buildings used for the same purposes are laid out more efficiently and the degree to which the older model is less efficient is difficult to decide. When an older building can be remodeled so as to be equally as efficient as a new one, accrued obsolescence is destroyed and the depreciation factors alone remain. When such remodeling is feasible and expedient the appraiser is justified in estimating the cost of such remodeling and letting the amount represent accrued obsolescence. In all other cases he must make a generous allowance based solely on judgment.

Another factor of obsolescence has to do with the exterior and interior design and ornamentation. Styles of architectural ornamentation which have become obsolete detract from market value.

Yearly Depreciation Item

After the appraiser has secured a figure to represent accrued depreciation and obsolescence and has given the building a present-day value by deducting the amount from the reproduction cost estimate, the evaluation processes which he uses presuppose the building value to be constant and invariable. Furthermore, his processes assume that the net income produced in commercial structures will be constant and invariable, and this assumption was based on the theory that annual deductions from gross income were made which would accumulate and replace the building as an asset. The building value to be replaced, from the appraiser's point of view, is the present-day building value—that is, the reproduction cost estimate less the computed accrued depreciation and obsolescence. Hence in computing net income the appraiser must select a yearly amount to deduct for depreciation and obsolescence—the yearly depreciation item.

Buildings, particularly office buildings, represent invested capital upon which fair returns are sought. It should, therefore, be possible to measure the yearly depreciation and obsolescence by the effect of age upon the net returns. It has been the experience in most buildings that the commercial life is less than structural or physical life. It is certain that in most appraisals the evaluator can best be guided by the attitude of the Treasury Department, inasmuch as the accounting procedure required in the computation of income tax returns is becoming standard practice.

Article 169 of Treasury Department, regulations 45, recommends the following accounting procedure:

"A depreciation allowance, in order to constitute an allowable deduction from gross income, must be charged off. The particular manner in which it shall be charged off is not material, except that the amount measuring a reasonable allowance for depreciation must be either deducted directly from the book value of the assets or preferably credited to a depreciation reserve account, which must be reflected in the annual balance sheet. The allowances should be computed and charged with express reference to specific items, units, or groups of property, each item or unit being considered separately or specifically included in a group with others to which the same factors apply. The taxpayer should keep such records as to each item or unit of depreciable property as will permit the ready verification of the factors used in computing the allowance for each year and for each item, unit, or group."

In other words, the Treasury Department recommends a treatment which is distinctly in accord with the accountant's point of view and concerns itself with capital

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replacement. There are several possible methods of computing the yearly depreciation item which may be suggested:

1. The Straight Line Method.—The straight line method is direct and simple. It assumes that the present-day value of the building divided by the number of years of remaining useful life exactly equals the yearly depreciation item.

For example, assume the case of a building having an estimated reproduction cost of $40,000, against which depreciation and obsolescence have accrued to an amount estimated at $10,000. Its present-day value is then $30,000. Assume that there are fifteen years of remaining useful life in the building and that its salvage value would be negligible. Then the yearly depreciation item is found thus:

$$D = \frac{\$30{,}000}{15} = \$2{,}000$$

Two thousand dollars is therefore the annual item which would be used in computing net income.

2. The Reducing Balance Method.—The reducing balance method charges off a fixed percentage of the value remaining each year. Thus a building valued at $100,000 to-day and depreciated by the reducing balance method at a fixed percentage of 3 per cent would be treated as follows:

1925	1926	1927	1928
$100,000	$97,000	$94,090	$91,267
3,000	2,910	2,823	2,738
$ 97,000	$94,090	$91,267	$88,529

This method depreciates the value more in the first years than later, and it is not permitted in calculating the deduction for depreciation from taxable income. Furthermore, such a method does not provide for a level annual deduction item for use when the value of a property is found by capitalizing net income, or when net income is treated as an annuity.

3. *Sinking Fund Method.*—In the sinking fund method it is assumed that a fixed amount is set aside each year and permitted to accumulate at compound interest. These amounts plus the interest accumulations on them are supposed to equal the present-day value of the building at the end of its useful life. Thus in applying the method the appraiser makes an estimate of the present-day value of the property and the remaining useful life. He selects an interest rate for his computation. He then finds what annuity at the selected rate accumulates to the value of the building in a term equal to the estimated remaining useful life of the structure. For illustration, assume a building with a reproduction value of $600,000 and accrued depreciation and obsolescence amounting to $100,000. It has a present-day value of $500,000. Assume an interest rate of 4 per cent per annum. Assume the building to have an estimated remaining useful life of twenty-five years.

The annuity which accumulates at 4 per cent interest to $1.00 in 25 years is $0.024 (from a sinking fund table). Hence the annuity which equals $500,000 in twenty-five years at 4 per cent is:

$$\$500{,}000 \times .024 = \$12{,}000$$

which would represent the yearly depreciation item when this method is used.

If a sinking fund table is not available, a table of amounts of 1 per annum at compound interest may be used. Such a table shows that $1.00 per year for twenty-five years at 4 per cent compound interest accumulates to $41.6459. Then:

$$\frac{1}{41.6459} = \frac{D}{\$500{,}000}$$

$$D = \frac{500{,}000}{41.6459} = \$12{,}000$$

which would represent the yearly depreciation item when this method is used.

The use of this method is not sanctioned because it increases the net income in an amount equal to the interest accumulations, and these modicums increase at an accelerating rather than a constant rate.

There are still other accounting devices which might be used in calculating the yearly depreciation item. Allowance can be made for the interest on the investment, salvage values, etc., but for most purposes in computing the item for use in real estate appraising it is unlikely that any process is superior to the straight line method.

Unit Depreciation

It is usually desirable to treat depreciation in the evaluation of most small buildings which are not very valuable as "composite depreciation." That is, the structure is depreciated as an entity with no particular reference to the physical units of equipment and fixtures of which it is composed.

On the other hand, in larger and more valuable buildings, particularly all mercantile buildings, the various units of the building can be specifically treated and depreciated at a variety of rates dependent upon the economical life of each of the units of equipment, etc. This process is known as "Unit Depreciation" and is customarily to be employed by the appraiser—even to the extent of a separate treatment in the depreciation of the items of indirect costs which enter building values.[1]

When unit depreciation is used and the straight line method of calculating the yearly deduction for each unit to be replaced, it is necessary to secure an additional item to cover the depreciation of the permanent overhead or indirect costs which are a part of the investment in the building. The outlays and losses incident to architect's fees, interest losses, taxes, insurance, etc., during the period of building construction are a part of the capital value of the building and disappear as assets with the gradual expiration of the structure. Hence the justification for depreciating them in the accounts.

The rate of depreciation which would be applied to these costs would be the same as that applied to the main structure and shell, inasmuch as the life of value of the permanent overhead may be assumed to be the same as the life of the building as such. A higher rate of depreciation applied to these indirect costs is not justified, however.

LAND VALUE AND DEPRECIATION

Land is not a wasting asset and the terms depreciation and obsolescence are not made to apply to it. For some unknown reason appraisers sometimes have made it their practice to treat the depreciation and obsolescence features of buildings by assuming them to be exactly offset by an appreciation in the value of the land. They make no deduction for depreciation and believe that the destruction of the building as an asset is precisely counter-balanced by an increase in land value. There is no justification for such a procedure and it should be avoided. A similar assumption is one which does make allowance for depreciation and obsolescence in the building, but assumes the land value as a constant. Land values decrease or appreciate in accordance with the principles already described, and, while indestructible in its entirety, portions of the value of land are destructible. Hence both land values and building values are subject to increase or decrease in value with the progress of years and provision for such inevitable changes are made in appraisal procedure. Nevertheless, the treatment of the two differs and depreciation and obsolescence as defined here are elements which are not present in land.

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[1] No table or schedule of unit depreciation rates is published in this book inasmuch as the National Association of Building Owners and Managers has had a number of experts studying experience data, which will result in the most accurate figures which we will have, and this material has not appeared as yet.

CHAPTER XI

THE APPRAISAL OF LEASE EQUITIES

In preceding chapters we have been discussing the total values of properties. We have also discussed the distribution of a total value between land and building. Now we discuss the value of an interest in a property in the form of a lease.

Long-term ground leases give the right of user to lessees in exchange for a rental consideration. From the fee holder's point of view the value of the property to him is the sum of the rental he receives and the value of the reversion of the right of user to him upon the expiration of the lease. To the lessee the value of the property is the difference between the present worth of the full value of the property for the term of the lease and the rental which he pays for the right to use the premises.

A logical procedure in the appraisal of lease equities assumes that the sum of the lessor's interest and the lessee's interest in the property will constitute the total value of the property. Thus if the total value of the property is found, and the value of the lessor's interest (the fee) is found, the value of the equity in the leasehold may be found by deducting the value of the fee from the total value of the property. The procedure, therefore, comprises the finding of a total value for the property, then the calculation of the value of the fee, and finally the value of the equity by finding the difference between the values of the property and the fee.

That the sum of these two values (that to the lessor and that to the lessee) constitutes the total value of the property in the way we have been analyzing it is true when the lease is mutually advantageous in all of its provisions to both parties. When there are provisions in the lease which operate to the disadvantage of either of the parties, such a lease may become an element which will affect the total value of the property. Thus a building clause may lower the total value of the property by affectnig the free utility of the property. A reappraisement clause may affect the total value of the property by impairing the security of the lease. The lessee does not care to spend much for maintaining the premises toward the end of a reappraisement period and deterioration of the building may be permitted to occur.

Thus the total value of a property under a long-term lease is discovered by the processes already discussed but corrected to meet the effect which the lease provisions have upon its utility during the term of the lease. This total value can then be divided between the interests in the property of the two parties by computing the value of the lessor's interest and deducting it from the corrected total value to secure the value of the lessee's interest in the property. The amount of value which the lessee thus has is, by definition, the equity in the lease.

Here again must distinction be made between stable and market value. We have assumed in all of the appraisal methods that market values in the long run tend to average at a level representative of true worth or stable value. The value of a fee or the equity in a leasehold, when computed in the above manner, are amounts which are true values and these amounts are subject to the same modification to correspond with market conditions as in the case of the valuations of entire properties not held under lease. That is, while a fee may have a very definite stable value based solely upon the rental consideration provided and actuarial computation, nevertheless purchasers of fees may require lower prices than the stable value in order to induce them to buy. Such market adjustment in the evaluation of fees is consistent with correct procedure in finding the sale value of the fee, but the amount to be deducted from the total value of the property in finding the value of the equity should always be the stable value of the fee.

Again, the value of the equity in a lease, as found by taking the difference between the total value of the property and the stable value of the fee, is the stable value of the equity in the lease and is itself subject to adjustment to a market value. Thus the sum of the stable values of fee and equity equal the total fair cash market value of a leased property, but the sum of the market values of fee and equity may be greater, but will usually be less than the total fair cash market value of the property.

It should also be pointed out that it is not a foregone conclusion that every lease contract has created an equity. The ground rental can very well be so high that no equity or a negative equity exists, and the fact that a leasehold estate is valueless or a negative asset is brought out by the same methods. Furthermore, the degree or amount to which the ground rent is higher than warranted by the productivity of the property is measured by deducting the value of the fee from the total value of the property.

COMPUTING THE TOTAL VALUE OF LEASED PROPERTIES

The total value of a leased property is found by the processes already explained with the exception that the lease provisions which affect utility are introduced into the methods.

That is, the total value of a property cannot be found without reference to the existence of the lease. Each of the processes which have been suggested for the calculation of total valuations of improved properties assumed that the property was owned by one individual who was at liberty to alter, rebuild, sell, or utilize the property in any way he saw fit. It was assumed that the value of the property would be dependent upon the best or correct future utilization and that no restriction other than expediency was placed upon such free use and change of use. The existence of a lease limits the free utilization of a property and in computing the total valuation of a leased property the degree to which such limitations operate must be introduced into the calculation.

For example, the lease may include a building clause providing that the lessee construct a specific character of improvement on or before a specific date. The assumption of the valuator as to highest and best use cannot be used. The appraiser adopts the provision as stated in the lease and on this basis goes through the same value analysis. As an illustration of this, assume the property to be improved with an old six-story obsolete loft building, and that the ground lease provides for a payment of $3,000 rent yearly during the next 81 years. Assume further that the lease provides for the erection of a twelve-story office building by the lessee to replace the old structure and to be ready for occupancy not later than four years from now. Also assume that the erection of such a building would be over-improvement of the site and that it would be preferable to replace the old building with a smaller new building than the one required in the lease.

If the total value of this property were to be found by the methods described in Chapter VII the old building might be given a value equal to, say, one year's rent from the tenants and the ground would be given a value equal to the present worth of its value after early improvement with a building which would represent the highest and best use of the site. Due to the existence of the building clause in the lease the appraiser must adopt its provisions in his appraisal—the lease is an incumbrance. He gives the old building a value equal to the present worth of an annuity of the net income of the present building for four years and he gives the land a value equal to the present value of the capitalized net income which the property will produce improved with the twelve-story building deferred four years, less the costs and losses involved in the removal of the old building and the erection of the new one. This will prove to be a lower total value because of the building clause.

Assume the net income which the present building is producing to be \$18,000 annually. Suppose the small correct improvement to cost directly and indirectly, were it to be built, \$140,000, and that it will produce a net rental of \$18,000 annually. Suppose, also, that the twelve-story building will cost \$280,000 and that it will produce a net rental of \$22,600 annually. Then:

1. Present stable total value of the property unencumbered by the lease:

$$V = (.943)\left[\frac{18{,}000}{.07}\right] - (.943)\,(140{,}000) + \$18{,}000$$

$$= \$128{,}466.$$

2. Present true total value of the property encumbered by the lease:

$$V = (.792)\left[\frac{22{,}600}{.07}\right] - (.792)\,(280{,}000) + (3.673)\,(18{,}000)$$

$$= \$100{,}057.$$

In this manner the true value of the property is found and then corrected for market elements in the usual manner. In this case the fair cash market value of the property might be placed at $95,000, the reduction in the amount of the stable value being the result of a very poor market in which to negotiate a sale of this sort of property.

It should be pointed out that there are very few lease provisions which actually do impair the value of a property. The clauses having to do with the future development of the ground (building clauses, etc.) constitute practically all of such provisions. Reappraisement clauses, too low or too high rental considerations, exceptional requirements in the form of security funds, unfair tax payment clauses, do obviously militate against the share of the total value which one of the parties can be said to own. Indeed, the provisions in a lease may very well actually destroy any value for one of the parties, and usually will ultimately destroy the lease. Nevertheless, the fair cash market value of the property (not of the fee or the equity alone) will usually be unimpaired.

Computing the Value of the Fee

To the fee holder or lessor the value of a leased property is the sum of the values of the rental he is to receive and the reversion at the expiration of the lease; this amount in some cases adjusted for exceptional requirements provided for in the clauses of the lease. The value of the fee is thus found by computing the present value of the rentals he is to receive and adding the present value of the reversion. His ownership is therefore an ownership of income plus an amount representing the present worth of the value of the real estate at the end of the term.

Thus the computation involves the taking of the present worth of a series of future rental payments at a rate per cent and the present worth of an amount deferred at a rate per cent. This is distinctly an actuarial problem and is computed in accordance with actuarial procedure.

If a property is leased for $10,000 per year for a period of 10 years, and if the property will have a fair cash market value of $250,000 at the end of the 10-year period, the ownership of the fee holder consists of the privilege to receive the ten rental payments as they become due and the right to use the property himself after the expiration of the lease. The rental payments deferred are not now worth their face values. They are worth only that amount which at interest would accumulate to amounts which would permit the $10,000 payments when they become due. Thus the present value of the rentals is found by discounting. The property reverts to the lessor upon the expiration of the lease and he receives a property worth at that time $250,000. The privilege of receiving the $250,000 ten years hence is called the reversion and the present value of the reversion will be equal to that sum, which at compound interest over the ten-year period will accumulate to $250,000. Thus the value of the reversion is found by discounting, and the sum of the discounted rentals and the discounted reversion equal the present value of the fee.

Discount may be defined as the consideration for the immediate payment of a sum due at a future date, and the total discount to be allowed for the present payment of a given sum due may be determined by reference to an effective rate of discount per annum, or a nominal rate of discount per annum convertible with a given frequency. The sum due, less the total discount upon it, is called its present value.

In computing the amount of discount deductible the rate of discount used depends upon the character of the property, its location, and the going rates of interest return upon such investments. The rate selected will be spoken of in terms of a nominal rate of discount. Rents are usually payable under most leases at periods more frequent than yearly. That is, most leases will be found to provide for rental payments monthly, quarterly, or semiannually. In such cases the actual amount of discount will be somewhat different because of the more frequent compounding, and we speak of nominal rates of discount meaning the yearly rate when compounding during the year does not occur, and effective rates of discount meaning thereby the amount of discount deductible when compounding occurs at intervals less than a year. Hence we define nominal and effective rates of discount.

The rate per unit per annum at which the actual discount for each stated interval is calculated when that interval differs from a year, or, in other words, the discount that would apply to each unit of principal in a year if the discount were not compounded, is called the nominal rate of discount.

The total discount deductible from 1 in a year, on the assumption that the actual discount compounds at intervals other than a year, is called the effective rate of discount.

There is an effective rate of discount corresponding to a given nominal rate of discount. For if the nominal rate of discount be f per annum convertible m times a year, the present value of 1 due $\frac{1}{m}$th of a year hence, will be $1 - \frac{f}{m}$. Similarly for each interval of conversion the sum due will be decreased in the ratio of

1 to $1 - \frac{f}{m}$. The present value of 1 due a year hence will, therefore, be $\left(1 - \frac{f}{m}\right)^m$. Thus the total discount on 1 for the year, or, in other words, the effective rate of discount corresponding to the nominal rate f, will be $1 - \left(1 - \frac{f}{m}\right)^m$. If the effective rate of discount is represented by d, then:

$$d = 1 - \left(1 - \frac{f}{m}\right)^m$$

$$\text{and } f = m\left[1 - (1 - d)^{\frac{1}{m}}\right]$$

From these relations the effective rate of discount corresponding to a given nominal rate, or the converse, may be calculated.

For illustration, if the nominal rate is 6% per annum, and it is desired to know the corresponding effective rate of discount when the amounts are convertible semi-annually:

$$d = 1 - \left(1 - \frac{.06}{2}\right)^2$$

$$d = .0591 = 5.91\%$$

To find the present value of a sum due n years hence, let S be the sum due, P its present value, and D the total discount on S. Let d be the effective rate of discount and f the corresponding nominal rate convertible m times per year. Then:

$$P = S\,(1 - d)^n = S\left(1 - \frac{f}{m}\right)^{mn}$$

$$\text{and } D = S\,[1 - (1 - d)^n] = S\left[1 - \left(1 - \frac{f}{m}\right)^{mn}\right]$$

For illustration, if the nominal rate is 6% convertible semi-annually, the sum is due two years hence, and if the sum due is $3000, then:

$$P = 3000\,(1 - \frac{.06}{2})^4 \qquad = \$2,655.88$$

$$\text{or } P = 3000\,(1 - .0591)^2 \qquad = \$2,655.88$$

$$\text{and } D = 3000\,[1 - (1 - \frac{.06}{2})^4] \quad = \quad \$344.12$$

$$\text{or } D = 3000\,[1 - (1 - .0591)^2] = \quad \$344.12$$

With these relationships at our disposal it is possible to calculate the present values of amounts payable at a future time, under the assumption that the present values will accumulate interest either at nominal or corresponding effective rates until exactly equal to the amounts due.

In the treatment of serial payments or rental installments we find simply an elaboration of the same method. Equal annual installments over a term constitute what is known as an annuity and it is possible to find the present value of an annuity by the same reasoning by reference to nominal and effective rates of discount.

An annuity is a series of payments made at equal intervals over a term of years. When the payments are of uniform amounts the annuity is measured by the total amount payable in a year, which amount is called the annual rent. Thus an annuity under which a payment of $\frac{k}{m}$ is made at the end of each $\frac{1}{m}$th year is described as an annuity of k per annum payable m times per year and k is called the annual rent.

An immediate annuity of k per annum payable quarterly for n years will consist of 4n payments of $\frac{k}{4}$ each made every three months, the first being made at the end of three months, and the last at the end of n years.

An annuity deferred is one in which the payments do not commence until after a stated lapse of time.

When the successive payments of an annuity are not taken as they fall due, but are left to accumulate at compound interest, the sum to which the payments and interest accumulate at the end of the period during which the annuity is payable is called the amount of the annuity. The sum of the present values of the successive payments is called the present value of the annuity.

In ordinary practice the present values of both amounts payable at future dates and series of future payments are found by the use of tables. The present values of amounts deferred are found in tables of "Present Value of 1 at Compound Interest." The first item in each table represents the amount which will accumulate to 1 at the nominal rate in one year. The second item represents the amount which will accumulate to 1 at the nominal rate in two years, and so on. The present values of series of payments to be made in the future are found in tables of "Present Value of 1 Per Annum at Compound Interest." The first item in each table represents the amount which will accumulate to 1 at the nominal rate in one year. That is, it represents the present value of the first installment under the assumption that the first installment will not be paid until the end of one year. The second item in each table represents the amount which will accumulate to 1 at the nominal rate in one year and leave a sufficient amount to further accumulate another 1 at the end of the second year. That is it represents the present value of the first and second installments under the assumption that they will not be paid until the end of each year; and so on. Thus these annuity tables give the present values of rents of $1.00 per year payable at the end of each year.

TABLE 2

COMPARISON BETWEEN DIRECT CAPITALIZATION AND PRESENT VALUE OF AN ANNUITY

Percent of Difference	*Term of Annuity in Years at Which Given Per Cent of Difference Will Occur When Using Nominal Interest Rate of*				
	4%	5%	6%	7%	8%
10.0	59	47	39	34	30
9.0	61	49	41	35	31
8.5	63	50	42	36	32
8.0	64	52	43	37	33
7.5	66	53	44	38	34
7.0	67	55	46	39	35
6.5	69	56	47	40	36
6.0	71	58	49	41	37
5.5	74	60	50	43	38
5.0	77	02	51	45	39
4.5	79	64	53	46	40
4.0	82	66	55	48	42
3.5	85	69	57	50	44
3.0	89	72	60	52	46
2.5	94	76	63	55	48
2.0	100	80	67	58	51
1.5	108	86	72	62	55
1.0	118	95	79	68	60
0.5	133	109	90	78	68

For example: If an appraiser does not mind an error of 1% in his work, he may use direct capitalization when using 6% as interest rate provided the term of the rental is longer than 79 years.

In reality rents are usually paid at intervals of less than one year and are due at the beginning of the periods rather than at the end of the periods. To make allowance for the effect of the more frequent payment periods the valuator calculates the effective rate of discount corresponding to the nominal rate he has assumed and applies it to the yearly rental to convert it into the single yearly rental payment which exactly corresponds to the series of more frequent payments made during one year. The yearly rental thus found can then be used in finding the present value of the annuity. To make allowance for the fact that the table gives the present values of payments made at the end of the year when in his problem the valuator usually finds rent payable in advance, it is customary to find the item in the table for one less year than the term and to add 1 to it. Thus, if the table gives $4.7665 as the present value of $1.00 per year for six years at 7% payable at the end of each year, then the present value of an annuity of $1.00 per annum for seven years, payable yearly in advance, will be equal to $1.00 plus $4.7665, or $5.7665. Tables are reproduced in the back of the book on pages 331-338 for this purpose and specific examples of their use follow.

There are several possible methods which can be used in the computation of reversion values. Theoretically, the value of the reversion should be equal to the fair cash market value of the property at the end of the lease term, less the discount. The actual amount of the discount can be computed as shown above but the value which the property will have at the end of the term cannot possibly be accurately or even approximately known, particularly when the lease runs for a great many years. Several quantities might be assumed to represent the value at the end of the period. For example, it can be assumed that the present fair cash market value of the property will continue without appreciation or depreciation and the value of the reversion can be found by finding the present value of the property deferred for the term of the lease, by deducting the total discount. Or the property can be assumed to have a value at the end of the lease term equal to the capitalized value of the last rental level provided for in the lease, and the value of the reversion can be found by finding the present value of this quantity deferred for the term of the lease by deducting the total discount.

These concepts are used in finding the values of series of rental payments in the computation of the immediate values of leased fees. Appraisers use tables of compound discount functions in these computations, and the formulas above are useful when the payment intervals are other than even years.

For example, suppose we wish to find the true value of the fee as of February 1, 1925, in a lease in which the provisions are as follows:

Date: February 1, 1910.
Term: Ninety-nine years, or to January 31, 2009.
Rental: Feb. 1, 1910, to Jan. 31, 1930, $5,000 yearly.
Feb. 1, 1930, to Jan. 31, 1950, 7,500 yearly.
Feb. 1, 1950, to Jan. 31, 2009, 10,000 yearly.
Rental payable yearly in advance.

These rentals correspond, on February 1, 1925, to:

An annuity of $5,000 yearly in advance for 84 years.
An annuity of $2,500 yearly in advance for 79 years and deferred for a period of 5 years.
An annuity of $2,500 yearly in advance for 59 years and deferred for a period of 25 years.

Assuming a nominal rate of discount of 5½% per annum, the present value of an annuity of $5,000, payable yearly in advance, over a term of 84 years is 18.9793 (from the tables) × $5,000, or $94,896.50. Similarly, an annuity of $2,500, payable yearly in advance, over a term of 79 years is 18.9026 × $2,500, or $47,256.50; and an annuity of $2,500, payable yearly in advance, over a term of 59 years is 18.3671 × $2,500, or $45,917.55. The latter two amounts, thus found, are the then present values of annuities deferred, and their present values on February 1, 1925, are found thus:

The present value of $47,256.50 at 5½% compound discount over a term of 5 years is:

0.7651 × 47,256.50 = $36,155.95.

The present value of $45,917.55 at 5½% compound discount over a term of 25 years is:

0.2622 × 45,917.55 = $12,039.58.

The present value of the series of rentals is, then:

$ 94,896.50
36,155.95
12,039.58
$143,092.03

In this example the reversion is so remotely deferred that it will have a very small present value. One method of finding it would be to assume the value of the property at the expiration of the lease to be the capitalized value of the last rental level:

$$\frac{\$10{,}000}{.055} = \$181{,}818.18$$

which amount deferred at 5½% per annum for 84 years would have a present value of $2,018.18.

Thus the value of the fee is equal to $143,092.03 plus $2,018.18, or $145,110.21.

Take another example: Suppose we wish to find the value of the fee as of May 1, 1925, in a lease in which the provisions are as follows:

Date: May 1, 1915.
Term: Thirty-five years, or to April 30, 1950.
Rental: May 1, 1915, to Apr. 30, 1925, $2,000 yearly.
May 1, 1925, to Apr. 30, 1935, 3,000 yearly.
May 1, 1935, to Apr. 30, 1950, 5,000 yearly.
Rental payable semi-annually in advance.

These rentals correspond, on May 1, 1925, to:

An annuity of $3,000, semi-annually in advance for 25 years.

An annuity of $2,000 semi-annually in advance for 15 years, and deferred for a period of 10 years.

Assume a nominal rate of discount of 6% per annum. By doubling the periods and halving the rate and annual payments, allowance is made for the semi-annual payment of the rent.

The present value of an annuity of $1,500 yearly in advance over a term of 50 years at 3% is 26.5017 × $1,500, or $39,752.55, and the present value of an annuity of $1,000 yearly in advance over a term of 30 years at 3% is 20.1885 × $1,000, or $20,188.50. This latter amount deferred at 3% for 20 years is 0.5537 × $20,188.50, or $11,178.37.

The present value of the series of rentals is then:

$$\begin{array}{r} \$39{,}752.55 \\ 11{,}178.37 \\ \hline \$50{,}930.92 \end{array}$$

The reversion value could be found by assuming the value of the property in 1950 to be the capitalized value of the final rental level:

$$\frac{\$5{,}000}{.06} = \$83{,}333.33$$

which amount deferred at 6% for 25 years would have a present value of $19,416.67.

Thus the value of the fee is equal to $50,930.92 plus $19,416.67, or $70,347.59.

An example follows in which the lease provides for a payment of $6,000 a year over the entire balance of the term—20 years—rent payable quarterly in advance. Assume a nominal interest rate of 5% per annum.

The present value of one year's rent quarterly in advance is lower than the full year's rent by an amount representing the discount on the three deferred installments. The actual amount of the discount is found by assuming each installment ($1,500) to be paid yearly in advance for four years at one-quarter the nominal discount rate. Thus the present worth of an annuity of $1,500 at 1¼% per annum, yearly in advance, for four years will equal the equivalent yearly rental in the problem, had the rent been payable yearly. To find the equivalent yearly rental then:

The present value of an annuity of 1 per annum for three years at 1¼%, payable at the end of the year, is 2.9265. Hence:

3.9265 × 1,500 = $5,889.75,
the equivalent yearly rental.

The remainder of the calculation corresponds to that in the other examples. The present value of an annuity of 1 per annum for twenty years at 5%, payable yearly in advance, is 13.0853. Hence:

13.0853 × 5,889.75 = $77,069.15,
the present value of the rentals.

The value of the reversion can be found by assuming the property to have the same total value at the time of the expiration of the lease as it now has. Thus, if the fair cash market value of the property to-day is $90,000, the value of the reversion is found by deferring $90,000 for a period of twenty years at 5%:

.3769 × 90,000 = $33,921.00,
the value of the reversion.

The total stable value of the fee is therefore:

Present value of the rentals.............	$ 77,069.15
Present value of the reversion..........	33,921.00
Value of the fee....................	$110,990.15

In a lease providing a rental of $24,000 a year, payable monthly in advance over the balance of the term, say, 94 years, the present value of the rentals would be found by a similar calculation. That is, the equivalent yearly rental would be computed and the amount so found would be treated as an annuity for 94 years. The calculation of equivalnet yearly rentals is apt to be lengthy, and the tables reproduced (in the back of the book) are of great assistance. They give the present values of amounts deferred by quarters or twelfths of a year and the present values of series of continuous payments made quarterly and monthly for several common nominal interest rates.

In the computation of the value of the leased fee above, utilizing 5½%, the equivalent yearly rental is found thus:

$$11.65 \times 2{,}000 = \$23{,}300.$$

Then the present value of the rentals is found as before:

$$19.0567 \times 23{,}300 = \$444{,}021.$$

There are still other devices which can be utilized, but they follow the same principles. In those cases where the term is not an even number of years, the tables of conversion reproduced on page 338 are of great convenience.

Again it should be pointed out that the fee values calculated by this method are truth worths or stable values and may differ somewhat from the amounts which it might be expected that a fee purchaser would pay for a fee. The market value of a fee will frequently be equal to the calculated stable value but at certain times market value and stable value may differ and the appraiser must adjust the stable value which he computes (and reports) to meet the conditions of the market of fee purchasers.

The values of the reversions can be computed in any of the several ways indicated in the examples, either by assuming the property upon the expiration of the lease to have a value equal to the capitalized value of the last rental level, or by assuming it to have a value at that time equal to the present-day value. It would be difficult to establish any rule indicating which would be preferable. In relatively short term leases the use of the present value of the property is more conservative and is probably the better practice.

The rates per cent utilized in these calculations will be dependent upon the risk, security, etc., which the holding of such assets represent when considered as investments, and the exact rates selected by the appraiser will be those which he derives by a comparison of the specific real estate investment with going rates in other real estate investments and in the general security market.

It should also be mentioned in passing that these calculations assume the immediate reinvestment of interest and capital sums collected, and under the same conditions of investment. There are certain instances where such an assumption is unwarranted and where direct correction of the error which the assumption introduces can be made by the valuator.

One of the most difficult problems involved in the appraisal of long-term leaseholds is introduced when the lease provides that the rentals shall be determined periodically by reappraisement. The value of the fee, under such circumstances, is usually considered to be the present worth of the rentals provided in the lease for the first period plus the present worth of an amount (roughly assumed) representing the full value of the property at the end of the first period.

Computing the Value of the Equity

The value of the equity in a leasehold (that is, the lessee's interest in the property) is equal to the difference between the total value of the property as computed and the value of the fee as computed above.

For illustration, the value of the equity in the first example in this chapter would be found thus:

It was found that the total fair cash market value of the property was		$95,000
Value of the fee:		
Rentals	$58,845	
Reversion	1,152	59,997
Value of the equity		$35,003

This amount, $35,003, is the stable value of the equity in the lease. In this instance the correction for market conditions can be made more definitely than in the cases of adjustment to market values of total values of properties and the values of fees. The actual present value of the ground might be $110,000, which at 5% would indicate an annual return of $5,500. That is, the annual equity on this basis would be $5,500 less $3,000 ground rent, or $2,500. This latter amount as an annuity for 81 years at 7% equals $35,565. The rate of 7% was used here because of the added hazard involved in the holding of land under a lease rather than in fee simple.

If in the computation the value of the fee is found to be greater than the total value of the property, the equity is negative in an amount represented by the difference between the total value and the value of the fee. The value of the fee cannot, obviously, be very much greater than the value of the property because the lessee will continuously suffer a loss and the security of the lease will disappear.

An alternate procedure in the computation of the value of the equity in a leasehold has already been suggested. In brief, the process consists of finding the annual gain enjoyed by the lessee and the computation of the present values of these gains over the entire period of the lease. Thus, if the ground produces $20,000 per year and the lease provides a ground rent of $12,000 per year, the $8,000 per year residue, taken as an annuity for the remainder of the term will give the stable value of the equity.

The illustration which follows shows the use of this alternate method in a "step-up" lease. Suppose a lease in which the rental consideration is as follows:

2 years: $4,000 quarterly in advance.
3 years: 6,000 quarterly in advance.
4 years: 6,500 quarterly in advance.
6 years: 7,000 quarterly in advance.

Assume, also, that the property has a present-day value of $150,000. At 5% this indicates an annual return on the ground of $7,500.

The lessee may then be assumed to enjoy yearly gains as follows:

2 years: $7,500 less $4,000 or $3,500
3 years: 7,500 less 6,000 or 1,500
4 years: 7,500 less 6,500 or 1,000
6 years: 7,500 less 7,000 or 500

which is equivalent to:

15 years, at $125 per quarter, plus
9 years, at $125 per quarter, plus
5 years, at $125 per quarter, plus
2 years, at $500 per quarter.

The present value of four installments of unity, each payable quarterly in advance at 5%, is 3.927 (see table). Thus we find the present value of the following annuities at 5%, payable yearly in advance:

$ 490.87 (15 years) × 10.899 = $ 5,349.99
490.87 (9 years) × 7.463 = 3,663.36
490.87 (5 years) × 4.546 = 2,231.50
1,963.50 (2 years) × 1.952 = 3,832.75

Stable value of the equity... $15,077.60

Another illustration of the alternate method: Suppose a lease in which the rental consideration is as follows:

10 years: $ 8,000 semi-annually in advance.
20 years: 10,000 semi-annually in advance.

Assume also that the property has a present-day value of $340,000. At 5% this indicates an annual return on the ground of $17,000.

The yearly equity is then:

10 years: $17,000 less $ 8,000 or $9,000
20 years: 17,000 less 10,000 or $7,000

which is equivalent to:

30 years, at $3,500 each half-year, plus
10 years, at 1,000 each half-year.

The present value of two installments of unity each, payable semi-annually in advance at 5%, is 1.9756. Thus we find the present value of the following annuities at 5% payable yearly in advance:

$6,914.60 (30 years) × 16.1411 = $111,609.25
1,975.61 (10 years) × 8.1078 = 16,017.85

$127,627.10

The use of this alternate method does not introduce the computation of a fee value, and it should be the rule in appraising leaseholds always to show a correctly computed stable value for the fee.

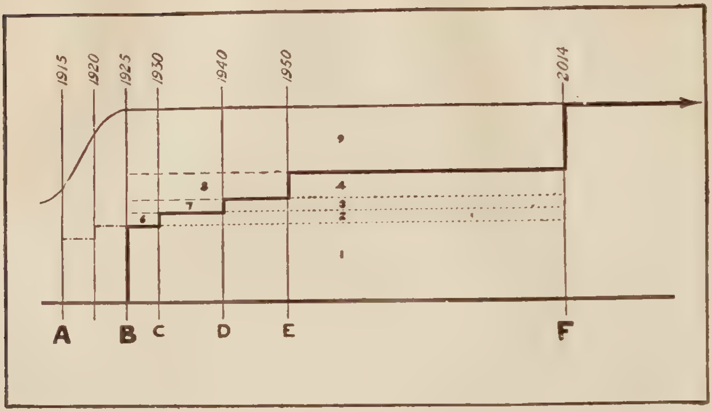


FIGURE 18: METHOD OF MEASURING VALUE OF EQUITY

The above diagram shows the method used in finding the value of a fee and the equity. It is based on a lease made in 1915 for a term of 99 years, and assumes the valuations to be made as of 1925. The rentals provided were:

5 years at $ 5,000 per year
10 years at 6,000 per year
10 years at 7,000 per year
10 years at 8,000 per year
64 years at 10,000 per year

The total net income of the ground has reached a level of $15,000, which, it is assumed, will persist indefinitely into the future.

The value of the fee is indicated by the areas 1, 2, 3, 4 and 5. The value of the equity is indicated by the areas 6, 7, 8 and 9.

TO FIND THE VALUE OF THE FEE:

(1) *Find value of area 1 as of date B*—It equals the present value of an annuity of $6,000 for 89 years.

(2) Find value of area 2 as of date C—It equals the present value of an annuity of $10,000 for 84 years.
(3) Find the value of area 2 as of date B—It equals the present value of an amount equal to the value found in (2) deferred 5 years.
(4) Find the value of area 3 as of date D—It equals the present value of an annuity of $10,000 for 74 years.
(5) Find the value of area 3 as of date B—It equals the present value of an amount equal to the value found in (4) deferred 15 years.
(6) Find the value of area 4 as of date E—It equals the present value of an annuity of $2,000 for 64 years.
(7) Find the value of area 4 as of date B—It equals the present value of an amount equal to the value found in (6) deferred 25 years.
(8) Find the value of area 5 as of date F—It equals the capitalized value of $15,000.
(9) Find the value of area 5 as of date B—It equals the present value of an amount equal to the value found in (8) deferred 89 years.
(10) Find the sum of the values of areas 1, 2, 3, 4 and 5 as of date B—This will equal the sum of the values found in (1), (3), (5), (7) and (9), and is the value of the fee.

To Find the Value of the Equity:

(1) Find the value of the property—It will equal the capitalized value of $15,000 per year.
(2) Find the value of the fee—This result was found by the method indicated above.
(3) Find the difference between (1) and (2)—This is the value of the equity.

To Find the Value of the Equity by the Alternate Method:

(1) Find the value of area 6 as of date B—It equals the present value of an annuity of $1,000 for 5 years.
(2) Find the value of area 7 as of date B—It equals the present value of an annuity of $1,000 for 15 years.
(3) Find the value of area 8 as of date B—It equals the present value of an annuity of $2,000 tor 25 years.
(4) Find the value of area 9 as of date B—It equals the present value of an annuity of $5,000 for 89 years.
(5) Find the sum of the values of areas 6, 7, 8 and 9 as of date B—This will equal the sum of the values found in (1), (2), (3) and (4), and is the value of the equity.

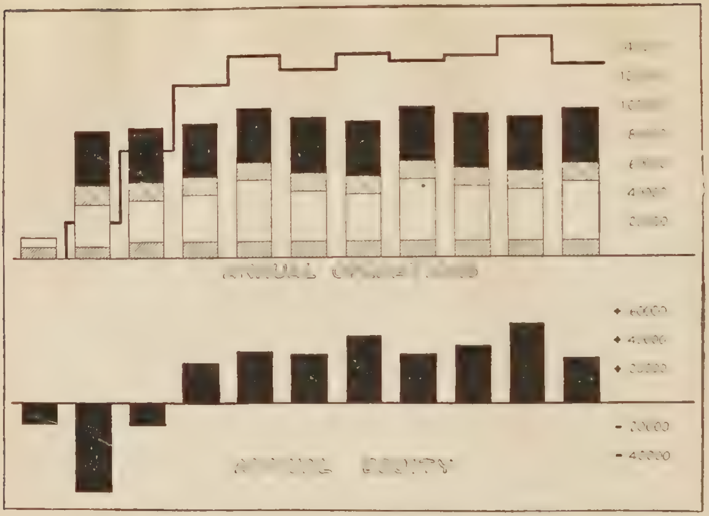


FIGURE 19: LEASEHOLD EQUITY
In the upper drawing, "Annual Operations":

■ Interest on investment in building.

▨ Depreciation and obsolescence.

□ Operating expenses and taxes.

▒ Ground rent.

The level indicated by the black line shows the gross income produced. The lower drawing, "Annual Equity," is derived from the upper one. The amounts are the difference in level between gross income and the height of the outlay columns.

LEVEL EQUIVALENTS AND ACTUARIAL AVERAGES

It is equally true of the value of leaseholds as of the total values of properties that the values change as time goes on and that the valuation process indicated above gives the value of the equity to-day. In some appraisal problems the appraiser may wish to analyze for comparative or other purposes the nature of a leasehold value. This can always be done by the application of the same actuarial processes and principles. A few examples of such problems should suffice to show the use of such analyses. In general, they involve the computation of level equivalents and actuarial averages.

If, for the purposes of comparing leases in which a variety of rental levels are provided, it is desired to know the corresponding level annual rental over the term of a lease, the appraiser finds the amount to which the actual rental payments and interest will accumulate at compound interest at the end of the period, and multiplies the amount by the coefficient found in a "sinking fund" table which gives annuities whose amount at compound interest are unity at the end of a given period. Thus, if a lease provides rental payments of:

$ 9,000 a year for 2 years,
10,000 a year for 5 years, and
12,500 a year for 82 years,

the amounts (at, say, 5%) at the end of 89 years are found:

9,000 × 1517.7212 = $13,669,490.80
1,000 × 1374.7585 = 1,374,758.50
2,500 × 1072.8298 = 2,682,074.50

Amount then = $17,726,323.80

The annuity whose amount in 89 years at 5% compound interest is equal to 1 is 0.000659.

The equivalent annual level rental is 17,726,323.80 × 0.000659, or $11,681.65.

Suppose an investment of $500,000 has been made, from which the expected net incomes are as follows:

1st year—loss of	—$15,000	—3.0%
2nd year—net profit	2,000	0·4%
3rd year—net profit	40,000	8·0%
4th year—net profit	35,000	7.0%
5th year—net profit	35,000	7.4%
6th year—net profit	42,000	8.4%

If it is desired to calculate the average rate of return on the investment over the entire period or any portion of it, the amounts to which the net incomes, when collected, will accumulate over the selected periods are found. These amounts are then multiplied by the annuity whose amount is unity at the same rate per cent in the corresponding periods, the result being the equivalent level net income over the periods. The average rate of return is then found by dividing by $500,000. This calculation appears thus:

The amounts to which the successive net profits accumulate at 6% for various terms:

Income For	*For 6 Years*	*For 5 Years*	*For 4 Years*	*For 3 Years*	*For 2 Years*
1st year.......	—$20,312	—$18,937	—$17,685	—$16,854	—$15,900
2nd year.......	2,525	2,382	2,247	2,120	2,000
3rd year.......	47,641	44,944	42,400	40,000	......
4th year.......	39,326	37,100	35,000	......	......
5th year.......	39,220	37,000	......	......	......
6th year.......	42,000	......	......	......	......
	$151,400	$102,489	$61,962	$25,266	—$13,900
The annuity whose amt. in period at 6% is unity....	.1434	.1774	.2286	.3141	.4854
	$21,711	$18,182	$14,164	$7,936	—$6,747
Average rate	4.34%	3.64%	2.83%	1.59%	—1.35%

The reversal of this process can frequently be used in arriving at a warranted price. For example, if the client desires to know what amount of investment he is warranted in making when the net profits are to be those indicated above and when he desires to have an average return of, say, 7 or 8%, the equivalent annual level net profits found above are capitalized at the rates, the result being that investment, in each case, which gives the average return desired. Thus:

The Warranted Investment

Average Rate Desired	*Over 6 Yr. Period*	*Over 5 Yr. Period*	*Over 4 Yr. Period*	*Over 3 Yr. Period*
7%	$310,157	$259,743	$202,343	$113,371
8%	271,388	227,275	177,050	99,200

A similar problem is one in which it is desired to know what amount of immediate investment is warranted when an annual rental is provided for under a lease. An illustration will explain.

Assume a leased property where the land has a value of $42,000, the building a value of $147,200, and that the lease provides for an annual rental of $14,500 for 15 years. Assume that the purchaser of the fee desires to know what amount of money he can invest in order to secure 6% interest per annum on his capital, 3% interest upon the invested interest collections, and find himself with capital unimpaired at the end of the 15 years.

If the warranted immediate investment is represented by the symbol X, then the investor wishes to secure .06X interest each year. The amount of an annuity of $1.00 per annum at 3% compound interest at the end of a term of 15 years is $18.346. Hence, the total accumulation of interest desired by the investor at the end of the period is equal to .06X (18.346). In addition to the interest accumulation, he desires his capital unimpaired at the end of the period. Hence the total accumulation of value at the end of the period must be X + .06X (18.346).

The property produces $14,500 each year for 15 years. At 3% compound interest these rentals will have accumulated to (14,500 × 18.346). The owner will have his land at that time, valued at $42,000. He will also have the building which by that time will have depreciated and obsolesced to a value of $58,800. Thus the total amount of value which will have accumulated at that time will be: (14,500 × 18.346) + 42,000 + 58,800. From the foregoing we secure the following equation:

$$X + .06X\,(18.346) = (14{,}500 \times 18.346) + 42{,}000 + 58{,}800$$
$$2.10076X = 366{,}817$$
$$X = \$174{,}611$$

Thus an investor is warranted in purchasing the fee for $174,611.

When the existing tenant leases in a building indicate rentals which are somewhat lower than those which will be secured with new tenants upon the expiration of some of the existing leases, an analysis similar to the following is possible. In this example it has been assumed that the building is to be removed in about 10 years and that no leases will be made to extend beyond that time.

Under the existing leases the income provided for is:

Income during 1925 — $456,200
" " 1926 — 451,100
" " 1927 — 392,700
" " 1928 — 356,400

As the leases expire, new tenants will be introduced at rental increases, which are estimated on the basis of the amounts of space left open each year, as follows:

Rental value of space open — 1926 — $ 10,400
" " " " " — 1927 — 80,900
" " " " " — 1928 — 132,000

Thus the effective gross rentals are estimated as follows:

Gross rental during 1925 — $456,200
" " " 1926 — 461,500
" " " 1927 — 473,600
" " " 1928 — 488,400
" " " 1929 — 488,400
etc. etc.

These rentals persist for 10 years. Hence they correspond to:

10 yrs. at $456,200 per year
plus 9 " " 5,300 " " deferred 1 yr.
" 8 " " 12,100 " " " 2 yrs.
" 7 " " 14,800 " " " 3 "

At 4% interest these sums accumulate at the end of the ten years to:

$456,200 × 12.0061 = $5,477,182.82
5,300 × 10.5828 = 56,088.84
12,100 × 9.2142 = 111,491.82
14,800 × 7.8992 = 116,908.16

Total accumulation $5,761,671.64

The annuity whose amount at 4% compound interest is 1 in 10 years is 0.08329.

Hence the average level gross rental is:

$5,761,671.64 × .08329 = $479,889.63

CHAPTER XII

COMPARATIVE VALUE ANALYSIS

In the preceding chapters attention was directed to the valuation of specific properties. We now discuss the relation in value between parcels of urban land. The values of lots in the same district are interrelated and graded. This fact is the principle of uniformity (see Chapter III). There are many real estate appraisal problems which are best solved by recourse to the principle of uniformity. For example, in appraising real estate for purposes of taxation, great injustice is apparent when the tax assessor fails to compare similar properties and neighboring properties. The fact of some uniformity in values is generally recognized and equity demands that similar lots be appraised and assessed similarly. The principle of uniformity also finds an application in analyzing transfers and leases. The use of such a principle is essential if comparisons of the sale prices or rental rates of properties are to be truly significant.

In this chapter, therefore, it is the purpose to inquire into the relations which exist between the values of lots. This is the study of comparative value.

PRINCIPLE OF UNIFORMITY

The principle of uniformity states that the established district is characterized by a basic or fundamental value. Small unit areas with like relationship to streets have very similar values. We will call this characteristic district value the "base value" and will usually express it in terms of the price of one foot of frontage on a street.

The principle of uniformity applies to the district as a whole. This is so because of the similarity of advantages throughout a district. The utilities of the sites are similar because the firms, or home seekers, attracted to the district make similar requirements for sites. It is obvious, then, that within a district common elements of value operate to form the base value. These factors apply with equal or similar force in determining the long-time values of all of the lots. In addition to these common elements there are other sets of value factors which can be classified under availability and accessibility. These may be items which operate to increase or decrease the values of a number of lots or of single lots; they may be common, partially common, or unique elements of value. A narrow street in the district is an element which affects the accessibility of all of the lots along it. A private alley is an element which might affect the values of only five or six lots. That a certain lot is at the corner of intersecting streets is a unique element of value which increases the value of the lot but not the value of other lots in the district.

The principle of uniformity applies to these additional elements of value as well as to the whole district. Should an element of value which is common to all of the lots along a street be analyzed, it might be found that it would affect the individual lots somewhat differently, but practically always in the same direction and in graded amounts of value. Thus a small open park and fountain at the end of a residential street would increase the values of all of the properties along the street, but it would increase the values of those nearer to it more than those farther away. In fact, the value derived from the presence of the park would be distributed in smaller and smaller modicums from the head to the foot of the street and a uniformity in the rate of decrease in the amounts of the modicums with the increase of distance would be apparent.

And so with numerous of the many availability and accessibility elements. They add or detract value, always increasing or decreasing the base value characteristic of the district, and doing so in uniformly graded rates as the distances from the sources of the values increase. Modicums of value derived from availability and accessibility features are functions of the distance to the origin of the value. The area and shape of lots are such factors and great attention must be given to the effect of lot dimensions upon utility.

Method of Comparing Values

The method used in comparing values is to select a "unit street value" which represents the base value of the district corrected for any additional elements of value which affect the particular block of the street in its entirety. This unit value, then, represents the front-foot price of a typical inside lot of ordinary dimensions. Such a unit value is best found by disintegrating the values indicated by sales of properties by means of the formulæ adopted. The values of other properties are then found by integrating their values by the same formulæ from the unit street value. Many such formulæ have been prepared by expert appraisers in various cities for use by tax assessors and other appraisers.

An Index of Real Estate Prices.—The price trends of most commodities and securities are commonly parts of reports and investigations of business conditions. Most of the many "business barometers" are based upon records of price trends. Still, the price trends of real estate are rarely indicated. There are two obvious reasons: (1) The price trends of real estate in even very closely neighboring districts seem to bear little relation to each other and could not be satisfactorily averaged; and (2) there has been no satisfactory unit in terms of which to state real estate prices.

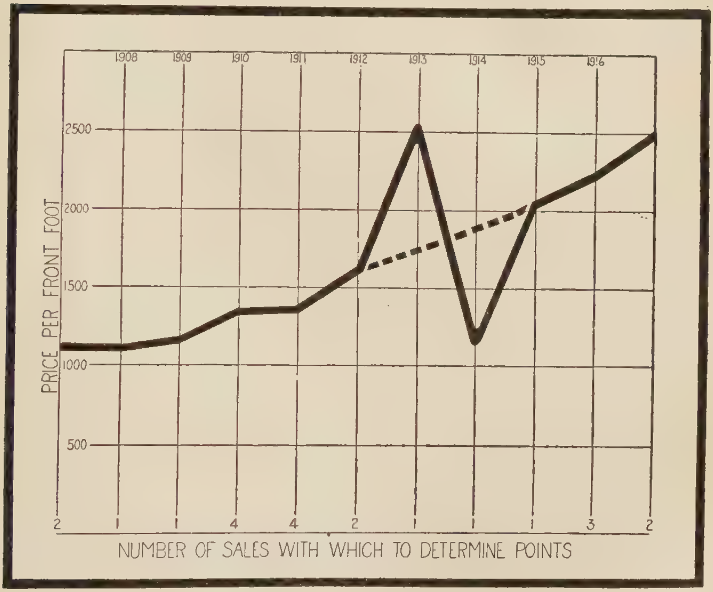


Figure 20: An Index of Real Estate Prices
This curve was derived through comparative analysis of the 22 sales which occurred in the block between 1907 and 1917. In 1912 the city passed an ordinance providing for a street improvement one block away. The work was completed in 1914.

To an appraiser of real estate some device for indicating the trends of real estate prices is valuable. Value is a market phenomenon, and, furthermore, a knowledge of trends is fundamental in appraising potential incomes.

The use of a real estate price index is practicable, provided it is made to apply only to a limited and homogeneous district. The method of constructing the index is obvious. The transfer prices of properties are reduced by formulæ to the unit street values, which are tabulated opposite to the dates of the transfers. The properties included must be very similar in character, and only typical sales can be used. Where market factors of extraordinary nature affected prices, such as an extreme necessity of one of the principals to buy or sell, the sale price cannot properly be included in making the price index. Rental price trends are constructed in the same manner and are usually subject to exactly the same limitations.

The Unit of Comparison.—The unit street value is defined in most of the value comparison systems as the value of a strip of land 1 foot wide on the street at the middle of the block and running to a depth of 100 feet. Needless to say, in any statistical problem the unit of measurement or comparison is fundamental and requires a much more thorough definition and exposition than is given above.

It would seem that a proper unit for a study of comparative real estate value should include:

1. Area of the unit.
2. Frontage and depth of the unit.
3. Character of lot from which the unit is assumed to be taken.
4. Dimensions of lot from which the unit is assumed to be taken.

Hence, it would help if a unit street value were defined as: The value of 100 square feet of ground, 1 foot in frontage and 100 feet deep, selected from a lot of a character typical of the real estate along the street, and having a frontage of 50 feet and a depth of 100 feet.

The proper selection of the unit street value is at the root of the use of the formulæ. What constitutes the typical sized lot in a district or city is a matter which might be open to variation in different localties, and the definition of unit street value above might be made to apply to the local typical lot sizes.

Given this unit to work with, the effect of lot frontage, lot depth, corner location, nearness to street intersection, and similar availability and accessibility elements are subjects for study.

Depth Tables.—The variations in ground value attributable to differences in depth, all other factors being equal in effect, have been studied by a number of individuals. It has been observed that the values of lots do not increase as rapidly as does depth; that is, of two lots with like frontages the deeper one will be the more valuable, but it will not be proportionally as much greater in value as it is deeper than the shorter lot.

It has been the intention of the author to use the depth tables which have been prepared by others for the purpose of deriving therefrom the principles which should probably govern in the making of such tables. Unfortunately, the decided similarity which exists between many of these tables is the result of a community of origin, and the custom of citing such similarity as evidence of the correctness of any one of the tables is not justified; nor is it warrantable that a table which has considerably different items than the majority be condemned on the basis of dissimilarity or disagreement.

The accompanying plates (Tables 3, 4, 5, and 6) show tables of value equivalents for various lot depths from 5 feet to 200 feet, as prepared by various experts for use in different cities.

TABLE 3

DEPTH TABLES

Depth in Feet	*Davies Rule; New York*	*Hoffman-Neill; New York*	*Somers Rule; Cleveland*	*Milwaukee Rule; of 1912*	*Harper Rule; London*
5	.12549	.17	.1435	.17	.23
10	.21676	.26	.2500	.28	.32
15	.29221	.33	.3322	.37	.39
20	.35799	.39	.4100	.44	.45
25	.41707	.44	.4790	.49	.50
30	.47117	.49	.5400	.54	.55
35	.52136	...	.5920	...	...
40	.56838	.58	.6400	.63	.63
45	.61277	...	.6845	...	...
50	.65493	.67	.7250	.70	.705
55	.69516	...	.7620	...	...
60	.73371	.74	.7950	.77	.775
65	.77077	...	.8261	...	...
70	.80649	.81	.8560	.84	.836
75	.84102	.84	.8830	.87	.866
80	.87447	.88	.9090	.90	.894
85	.90694	...	.9333	...	...
90	.93849	.94	.9560	.95	.950
95	.96921	...	.9785	...	...
100	.99917	1.00	1.0000	1.00	1.000
105	1.02841	...	1.0208	...	...
110	1.05698	...	1.0400	1.03	1.05
115	1.08493	...	1.0578	...	...
120	1.11230	...	1.0750	1.07	1.095
125	1.13912	1.12	1.0905	1.09	1.126
130	1.16542	...	1.1050	...	...
135	1.19123	...	1.1180	...	...
140	1.21658	...	1.1300	1.13	1.182
145	1.24149	...	1.1405	...	...
150	1.26599	1.18	1.1500	1.15	1.224
155	1.29009	...	1.1595	...	...
160	1.31382	...	1.1680	1.17	1.264
165	1.33718	...	1.1764	...	...
170	1.36020	...	1.1840	...	...
175	1.38289	1.22	1.1914	1.19	1.323
180	1.40527	...	1.1980	1.20	1.342
185	1.42734	...	1.2043	...	...
190	1.44912	...	1.2100	...	...
195	1.47062	...	1.2153	...	...
200	1.49186	1.25	1.2200	1.22	1.414

TABLE 4

Depth Tables

Depth in Feet	*Martin Rule; Chicago*	*Janssen Rule; Milwaukee*	*King's Rule; Milwaukee*	*Milwaukee Rule; of 1911*	*Lindsey-Bernard; Baltimore*
5	.1495	...	...	.09	.09
10	.1990	.12	...	.17	.15
15	.2475	.18	...	.24	.21
20	.2960	.24	...	.30	.27
25	.3435	.30	...	.35	.33
30	.3910	.35	...	.40	.385
35	.4375	.40	...	...	.44
40	.4840	.45	.454	.50	.49
45	.5295	.49	.517	.55	.54
50	.5750	.52	.573	.60	.585
55	.6195	.56	.623	.64	.63
60	.6640	.59	.668	.67	.67
65	.7075	.64	.709	.71	.706
70	.7510	.68	.746	.75	.739
75	.7935	.71	.780	.78	.769
80	.8360	.75	.811	.81	.796
85	.8775	.78	.839	.84	.82
90	.9190	.82	.865	.87	.842
95	.9595	.85	.890	.90	.862
100	1.0000	.88	.914	.92	.88
105	1.0395	.91	.937	.95	.896
110	1.0790	.94	.959	.97	.911
115	1.1175	.97	.980	.98	.925
120	1.1560	1.00	1.000	1.00	.938
125	1.1935	1.02	1.019	1.01	.95
130	1.2310	1.04	1.037	1.02	.961
135	1.2675	1.06	1.055	1.03	.972
140	1.3040	1.08	1.072	1.04	.982
145	1.3395	1.10	1.089	1.04	.992
150	1.3750	1.12	1.105	1.05	1.000
155	1.4095	1.135	1.121	1.05	...
160	1.4440	1.15	...	1.05	...
165	1.4775	1.165	...	1.06	...
170	1.5110	1.180	...	1.06	...
175	1.5435	1.195	...	1.07	1.030
180	1.5760	1.21	...	1.07	...
185	1.6075	1.225	...	1.08	...
190	1.6390	1.24	...	1.09	...
195	1.6695	1.255	...	1.10	...
200	1.7000	1.275	...	1.10	1.050

TABLE 5

Depth Tables

Depth in Feet	Recomputed on basis of 100 ft. as standard.			
	Janssen Rule; Milwaukee	*King's Rule; Milwaukee*	*Milwaukee Rule; of 1911*	*Lindsey-Bernard; Baltimore*
5	...	...	.10	.10
10	.14	...	.18	.17
15	.20	...	.26	.24
20	.27	...	.33	.31
25	.34	...	.38	.38
30	.39	...	.44	.44
35	...	...	...	.50
40	.51	.497	.54	.56
45	.56	.566	.60	.61
50	.59	.627	.65	.66
55	.64	.682	.69	.72
60	.67	.731	.73	.76
65	.73	.775	.77	.80
70	.77	.816	.82	.84
75	.81	.853	.84	.87
80	.85	.888	.88	.90
85	.89	.918	.91	.93
90	.93	.946	.94	.96
95	.97	.974	.97	.98
100	1.00	1.000	1.00	1.00
105	1.03	1.025	1.03	1.02
110	1.07	1.049	1.05	1.04
115	1.10	1.072	1.07	1.05
120	1.14	1.094	1.09	1.07
125	1.16	1.115	1.10	1.08
130	1.18	1.134	1.11	1.09
135	1.20	1.154	1.12	1.10
140	1.23	1.173	1.13	1.12
145	1.25	1.192	1.13	1.13
150	1.27	1.209	1.14	1.14
155	1.29	1.226	1.14	...
160	1.31	...	1.14	...
165	1.32	...	1.15	...
170	1.34	...	1.15	...
175	1.36	...	1.16	1.17
180	1.37	...	1.16	...
185	1.39	...	1.17	...
190	1.41	...	1.18	...
195	1.43	...	1.19	...
200	1.45	...	1.19	1.20

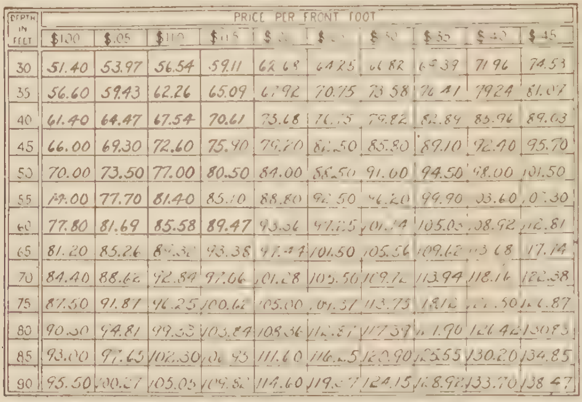
TABLE 6

Depth Tables

By McMahon, Pittsburgh

Depth in Feet	*Businesss*	*Residential*	*Depth in Feet*	*Warehouse*
30	.5140	.4750	30	.3900
35	.5660	.5200	35	.4475
40	.6140	.5700	40	.5000
45	.6600	.6120	45	.5520
50	.7000	.6550	50	.6000
55	.7400	.7000	55	.6490
60	.7780	.7400	60	.6925
65	.8120	.7800	65	.7380
70	.8440	.8200	70	.7800
75	.8750	.8570	75	.8200
80	.9030	.8900	80	.8600
85	.9300	.9200	85	.8960
90	.9550	.9500	90	.9325
95	.9780	.9750	95	.9675
100	1.0000	1.0000	100	1.0000
105	1.0190	1.0190	105	1.0240
110	1.0380	1.0380	110	1.0475
115	1.0550	1.0550	115	1.0705
120	1.0730	1.0730	120	1.0925
125	1.0900	1.0900	125	1.1140
130	1.1080	1.1080	130	1.1355
135	1.1240	1.1240	135	1.1565
140	1.1400	1.1400	140	1.1770
145	1.1550	1.1550	145	1.1970
150	1.1700	1.1700	150	1.2150
155	1.1850	1.1850	160	1.2520
160	1.2000	1.2000	170	1.2870
165	1.2140	1.2140	180	1.3200
170	1.2280	1.2280	190	1.3510
175	1.2400	1.2400	200	1.3800
180	1.2530	1.2530	210	1.4070
185	1.2650	1.2650	220	1.4325
190	1.2780	1.2780	230	1.4565
195	1.2890	1.2890	240	1.4790
200	1.3000	1.3000	250	1.5000
205	1.3100	1.3100	260	1.5200
210	1.3200	1.3200	270	1.5400
215	1.3300	1.3300	280	1.5590
220	1.3400	1.3400	290	1.5770
225	1.3500	1.3500	300	1.5940
230	1.3600	1.3600	310	1.6090
235	1.3700	1.3700	320	1.6220
240	1.3800	1.3800	330	1.6340
245	1.3900	1.3900	340	1.6420
250	1.4000	1.4000	350	1.6500

The tables prepared by Mr. Thomas C. McMahon of Pittsburgh have been compiled in a very convenient form for tax assessors by indicating the equivalent front-foot values of lots of various depths for a variety of unit street values. The accompanying plate represents a small portion of these compilations which were made for unit street values ranging from $100 to $6,000 for the business curve, $10 to $250 for the residential curve, and $50 to $205 for the warehouse curve.



DEPTH IN FEET	PRICE PER FRONT FOOT									
	$100	$105	$110	$115	$120	$125	$130	$135	$140	$145
30	51.40	53.97	56.54	59.11	61.68	64.25	66.82	69.39	71.96	74.53
35	56.60	59.43	62.26	65.09	67.92	70.75	73.58	76.41	79.24	81.07
40	61.40	64.47	67.54	70.61	73.68	76.75	79.82	82.89	85.96	89.03
45	66.00	69.30	72.60	75.90	79.20	82.50	85.80	89.10	92.40	95.70
50	70.00	73.50	77.00	80.50	84.00	87.50	91.00	94.50	98.00	101.50
55	74.00	77.70	81.40	85.10	88.80	92.50	96.20	99.90	103.60	107.30
60	77.80	81.69	85.58	89.47	93.36	97.25	101.14	105.03	108.92	112.81
65	81.20	85.26	89.32	93.38	97.44	101.50	105.56	109.62	113.68	117.74
70	84.40	88.62	92.84	97.06	101.28	105.50	109.72	113.94	118.16	122.38
75	87.50	91.87	96.25	100.62	105.00	109.37	113.75	118.12	122.50	126.87
80	90.30	94.81	99.33	103.84	108.36	112.87	117.39	121.90	126.42	130.93
85	93.00	97.65	102.30	106.95	111.60	116.25	120.90	125.55	130.20	134.85
90	95.50	100.27	105.05	109.82	114.60	119.37	124.15	128.92	133.70	138.47

FIGURE 21: FORM OF McMAHON TABLES

These depth systems are in use in various parts of the country. From them we may derive the laws which should probably govern in the preparation of such comparative value systems.

In considering the magnitudes of the value increments from various value elements we assume that each value element will act with mathematical uniformity. That is, if the area of one lot is greater than that of another, that increment of value attributable to area will be greater in the lot. If four lots are 25 feet, 50 feet, 75 feet, and 100 feet deep; they will be more and more valuable in succession. If one inside lot is closer to an intersecting street than another lot, the increments of value to be added to each by virtue of the presence of the cross street will be greater in the case of the closer lot. Thus we usually know the direction in which an element of value operates.

To arrive at a method of fixing the exact amounts of value increments after the direction which they take is known, is not always possible. We know that the value increment added by virtue of additional depth does not increase as rapidly as additional lot area increases. But we do know that additions to the depths of lots become of less and less value as the depth increases. Thus we know not only the direction which increments take, but frequently we know the curvature, or change of direction, which they take.

We can determine other directions of this character. The increment of value to be added by virtue of corner influence will bear a greater percentage to the base value of the district in the cases of retail districts than in wholesale districts. The same percentage measurement might be reduced to absolute zero in the case of most residential districts. And so with all of the availability and accessibility elements of value. The character of the utilities which make the district, that is, the "class of real estate," gives us additional direction data.

The principal fault with most of the depth tables which have been prepared is that they are supposed to represent changes in value due to depth in all kinds of districts. It has been supposed that an average of conditions in many different districts would produce a single curve representative of all real estate. The most recent curve which had been offered is called deliberately an "average" depth table. Averaging such relationships simply accumulates the errors introduced. Segregation of the relationships introduces a refinement of measurement and obviates the obvious failure of any one curve finding general application. Thus we can show that any statistical aid to comparative appraising should indicate quantitative differences corresponding to the characteristics of the districts in which it is applied. This means, then, that many depth tables are needed, and that they may be very different in their items, solely dependent upon the importance of depth as an element of value under the many different conditions found in different kinds of real estate districts.

If we know the directions of such value elements when applied to various districts and lots we can solve for the approximate laws which control these elements and can, in turn, use these laws in estimating the value increments used to integrate values. Such laws are useful, and in their usefulness is found the principal justification for announcing them. They are approximately correct laws only, however, so long as the assumptions on which they rest and the statistical method which is used in solving for them are acceptable.

It would seem that there are eight assumptions necessary to establish these value increment laws. These can be listed as follows:

1. Value will increase with additions of frontage, depth, or of area.
2. The increments of value derived from depth additions become smaller in ratio to the amount of depth added.
3. The increments of value derived from additions of frontage or area become larger in ratio to the amount of frontage or area added.
4. The amounts of value created in increments of depth, frontage, or area, or from any similar source of value, are graded uniformly as differentials.

5. Base values of streets or districts are approximately truly represented by the front-foot values of the typical sized small lot of usual depth in the lowest value points of the inside of the blocks.
6. Average statistics as applied to many sale prices of real estate and to values computed on the basis of rental income, provided typical instances are selected, will produce a satisfactory group of data from which to actually select points in the derivation of the laws in measurable and quantitative terms.
7. Such laws do not provide any allowance for market factors which affect real estate values except in so far as the selection of base or unit values are concerned.
8. The application of such laws, based as they are upon average statistics and typical instances, can have no very general application to irregularly shaped lots, exceptionally deep, or wide, lots, etc., but are useful primarily in the analysis of value in lots of a character very closely comparable to the data upon which the law is founded.

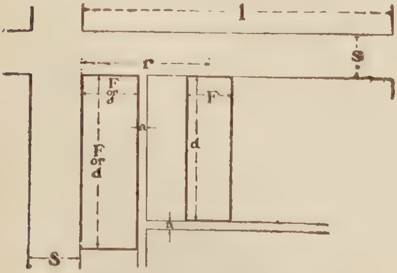
It has undoubtedly been apparent to the reader during this discussion that certain of the availability and accessibility elements are not readily susceptible of reduction to statistical rules. The influence of lot dimensions, area, sidewalk width, presence of various sizes of alleys, street widths, length of block, presence of intersecting streets, and all such elements as are concerned with the geometry of the site can be brought under statistical treatment. Those elements of value which are attributable to "structural possibilities," as limited by ground shape and area, are likewise susceptible to statistical measurement. On the other hand, there are many increments of value which cannot be solved. The influence of a neighboring elevated or subway station, the reflection of value from a certain fine building in the district, etc., cannot be measured by this method, but, fortunately, most of such value elements affect many lots similarly and the increment which they add to the district base value can be somewhat satisfactorily accounted for.

All such elements of value can usually be estimated as having a lump sum constant effect upon the street unit value. The subway entrance is said to increase the value so many dollars per front foot, or the presence of a coal yard is said to decrease the unit street value so many dollars. That is, we recognize that most of the unmeasurable elements which create value increments affect many lots usually located on the same street.

The unit street value is then the unit which is manipulated in the integration of the individual lot values, and the remaining increments to be added are those caused by the geometric features of the site itself and its immediate surroundings.

MEASURABLE VALUE ELEMENTS

The measurable elements are those which can be associated with the immediate geometry of the sites. By relating the dimensions of lots, streets, and alleys, we find the elements which require such analysis. The dimensions involved are:



"F"—Frontage of lot.
"d"—Depth of lot.
"s"—Width of street.
"a"—Width of alleys.
"r"—Distance to cross street.
"w"—Width of sidewalk.
"l"—Length of block.

Figure 22

These dimensions constitute the materials out of which comparative value formulæ are made. The effects which they will have in any formulæ are indicated below. The actual derivation of typical formulæ is reserved for later.

"F"—Frontage of Lot.—As frontage increases, lot value increases in direct or greater proportion. It never increases in city property in less than direct proportion. There is no wholesale price of real estate in the sale of individual lots. The cases where value increases in greater than direct proportion are those in which the utility of the lot is affected by the importance for display and immediate access, or by the importance of area itself in its effect upon efficient building construction and managerial savings (See plottage value in Chapter III). Thus in the comparison of lot values, the values attributed to lots will vary in greater than direct proportion to frontage increases in retail and commercial districts, in wholesale districts, in apartment districts., etc., and more so in all instances where property is used for larger buildings.

"d"—Depth of Lot.—As depth increases value increases in less than direct proportion. The rate of value increase will be very low in retail districts, will be relatively higher in wholesale districts and in apartment districts, and will very nearly approach direct proportion in industrial property. The rate of increase itself will vary as depth increases, and a variety of rates of change in the rate will be necessary in various kinds of properties. Inasmuch as depth additions increase the plottage values of lots, the portion of plottage which is attributable to depth alone will be computed directly into the depth curves, while that portion of plottage which might be attributed to the frontage dimension will form the basis of the frontage allowances where frontage increases value in greater than direct proportion.

"s"—Width of Street.—Variations in street widths within the ordinary limits (say, 60 feet to 80 feet) will not noticeably affect value. Variations beyond ordinary

widths of streets will tend to impair value except in established high-class retail or financial districts. Those variations which are narrower will impair value to a much greater extent than will exceptionally wide streets. Such allowances can have no particular application except in retail, commercial and wholesale districts. Where street width affects all of the lots, the element has already been allowed for in the unit street value. Where sudden changes in width occur, however, analysis is possible.

"a"—Width of Alleys.—The value additions derived from side alleys are to be found in three elements: Light, air and additional accessibility. Both dimensions of the alley, its width and its length along the lot, affect these elements. Likewise such value elements will increase lots of greater area relatively less than smaller lots. Hence the value derived fom a side alley will be a function of the area of the alley, the area of the lot, and the width of the alley directly. If Y equals the length of a side alley and Z its width, and if F and d equal respectively the frontage and depth of the lot, the law which will indicate the effect of the influence of a side alley can be stated as follows:

$$\text{As } \frac{Y \times Z}{F \times d} + K \times Z \text{ increases, lot value will increase,}$$

in which K represents a constant indicating the relative importance of the area relationship and the mere fact of alley width in determining side-alley influence. In actual formulæ differences based upon kind of district are introduced.

The widths of rear alleys affect values and can be treated in the same manner. The statement of the law above remains true although the quantities in the relationship may differ.

"r"—Distance to Cross Street.—The presence of an

intersecting street at a short distance in most districts will increase the value of an inside lot. As the distance increases the amount of the additional value will decrease. If this distance is always measured from the point of the street intersection to the middle point in the frontage of the lot, no errors are introduced because of variations in frontage. This provides an average distance to the cross street from the lot. In such districts as those having commercial use where corner reflection is in existence, the value of inside lots may be made to vary as functions of this distance. The simplest reasonable relationship being to add the value of the lot computed as an ordinary inside lot without reflection to an amount which can be called the reflected value and computed as a function of the lot dimensions, the distance to the cross street, and the unit street value of the cross street.

"w"—Width of Sidewalk.—As opposed to the case of street widths, excessive sidewalk widths probably do not decrease value. The only allowance for the value differences introduced by sidewalk width is in the cases of excessively narrow sidewalks. The law which would measure such impairment would be similar to the first half of the curve showing the influence of street width. It is not likely that any actual statement of such a law would be of material assistance in actual practice in most cities.

"l"—Length of Block.—The ordinary lengths of blocks have no effect upon the values of lots. Excessive lengths may impair value somewhat. Short blocks will not change values due directly to block length as the factor.

THE GENERAL PROBLEM

It is to be assumed in the development of a set of real estate formulæ that the observer will not feel constrained to object to such methods on the basis of restrictions which always will limit such systems in application, but that he will seek in these formulæ the principles involved and will be decidedly "sensible" in using them. Many of the tables following are carried out to five decimal places for the reason that some valuators wish them in this form, but it should be obvious that not more than one decimal place will probable suffice for most purposes and that the exceedingly precise refinement of these systems is neither necessary or desirable.

The pages which follow outline the principles utilized in the derivation and building of comparative value systems and the actual formulæ derived are to be accepted as suggestive. It is probable that these formulæ are equally as applicable in one community as another, but not necessarily so, and the expert appraiser or assessor may follow the same qualitative analysis although for some reason he might not accept the actual quantities which appear in the results. The bases for the quantities which appear in the various assumptions were secured by a statistical analysis of sales of Chicago real estate.

A set of formulæ for the comparison of real estate values may be made to include:

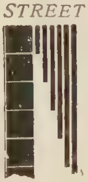
1. Depth tables
2. Methods of corner computation.
3. Formulæ for the computation of corner reflection.
4. Plottage allowance methods.
5. Systems for allowances for alleys and for street widths, irregularly shaped parcels, etc.

Each formula or system should be a generality capable of application to varying conditions of utility and district by means of the substitution of quantitative variations. The suggested formulæ below follow these principles.

Depth Tables.—In constructing a depth table we make the following assumptions:

1. Value will increase when depth increases.
2. The increments of value derived from depth additions become smaller and smaller as the depth additions become more remote and distant from the street frontage.
3. The amounts of value created by successive increments of depth are graded uniformly as differentials.
4. The rate of decrease in the values of successive increments of depth will be different in different cities and in different kinds of districts.

Given these assumptions, the general law or formula which is assumed to represent the effect of variations of depth upon value can be stated in the form of a table of equivalents, showing the value increment corresponding to each additional unit of depth. For example:



Successive Depth Additions	*Value of Addition*	*Depth of the Lot*	*Value of the Lot*
1st foot	100 units	1 foot	100 units
2nd foot	98 units	2 feet	198 units
3rd foot	95 units	3 feet	293 units
4th foot	91 units	4 feet	384 units
5th foot	86 units	5 feet	470 units
etc.	etc.	etc.	etc.

That is, according to the table, a lot 5 feet deep would be worth 4.7 times the value of a lot 1 foot deep, and 470/293 times a lot 3 feet deep, etc. To construct such a table in terms of the percentages of value which lots bear to lots 100 feet deep, the amounts in the last column are converted into proportional amounts, allowing the value of the 100-foot lot to be represented by the index number 100.

Two essential analyses remain: (1) To ascertain the rate of fall in the values of the increments, and (2) to express the law controlling the relationship of depth and value.

The rate of fall of the values of the increments must of necessity be rather an arbitrary assumption, but there are general rules which can be followed to a certain degree. The simplest device would be to draw a smooth curve through known or accepted points and construct a depth table directly from the readings on the chart so made. Greater control over the curve can be had, however, by studying the rate of fall of the value increments from the relative values for the front and rear halves of lots of various depths.

For example, by a study of similar sales we may discover that (say, in the wholesale district) lots 160 feet deep are usually worth about 33 1/3% more than lots 80 feet in depth (or that 80-foot lots are worth about 75% of 160-foot lots). If we make the generality then that in the wholesale district a lot one-half the depth of another is worth 75% of it, we could construct a table in which this percentage would remain constant. A lot 24 feet deep would be assumed to be worth 75% of the value of a lot 48 feet deep. A lot 100 feet deep would be assumed to be worth 75% of the value of a lot 200 feet deep. The equation representing such a curve is $V = kd^a$, where V is value, d is depth, and a and k certain constants determined by the constant percentage adopted. This is an exponential equation and the solution is found by solving: $\log. V = \log. k + a \log. d$, where $100 = k\ 100^a$. Solved for each increment of depth the whole table could be made. A set of such depth tables for use with different characters of property could be made by using different constant percentages.

The table to be used in a retail district would have a higher constant percentage than one for use in an apartment district, because depth is of less importance to retail shops than to apartments. The precise amounts which would appear in the Hoffman table would be found by this method, using the constant percentage 66⅔. The appearance of such tables, computed with constant percentages of 62.5% and 75%, based on a standard depth of 100 feet, are given in the accompanying tables.

TABLE 7

Depth in ft.	*Coef. d* 62.5%	*Coef. d* 75.0%	*Depth in ft.*	*Coef. d* 62.5%	*Coef. d* 75.0%
1	.04404	.14770	51	.63357	.75597
2	.07047	.19695	52	.64194	.76208
3	.09277	.23355	53	.65028	.77002
4	11277	.26265	54	.65857	.77410
5	.13118	.28820	55	.66680	.78018
6	.14845	.31086	56	.67500	.78777
7	.16478	.33146	57	.68313	.79177
8	.18042	.35025	58	.69120	.79744
9	.19539	.36791	59	.69936	.80316
10	.20990	.38433	60	.70730	.80892
11	.22390	.39982	61	.71532	.81433
12	.23753	.41460	62	.72327	.81978
13	.25072	.42854	63	.73097	.82528
14	.26362	.44200	64	.73892	.83080
15	.27631	.45478	65	.74680	.83618
16	.28867	.46711	66	.75440	.84140
17	.30073	.47911	67	.76225	.84664
18	.31269	.49055	68	.77002	.85252
19	.32436	.50137	69	.77750	.85704
20	.33585	.51250	70	.78523	.86218
21	.34777	.52300	71	.79287	.86736
22	.35817	.53325	72	.80038	.87236
23	.36917	.54312	73	.80780	.87740
24	.38000	.55212	74	.81527	.88226
25	.39064	.56250	75	.82282	.88736
26	.40126	.57150	76	.83023	.89208
27	.41164	.58050	77	.83772	.89702
28	.42190	.58937	78	.84508	.90198
29	.43200	.59800	79	.85232	.90656
30	.44210	.60637	80	.85960	.91138
31	.45210	.61471	81	.86696	.91622
32	.46189	.62286	82	.87418	.92086
33	.47155	.63100	83	.88166	.92555
34	.48133	.63886	84	.88858	.93006
35	.49078	.64657	85	.89578	.93454
36	.50025	.65416	86	.90282	.93930
37	.50955	.66157	87	.90992	.94363
38	.51889	.66900	88	.91706	.94820
39	.52822	.67643	89	.92406	.95258
40	.53725	.68343	90	.93100	.95798
41	.54637	.69057	91	.93800	.96140
42	.55525	.69743	92	.94515	.96583
43	.56429	.70433	93	.95214	.97028
44	.57314	.71100	94	.95896	.97456
45	.58200	.71767	95	.96583	.97883
46	.59071	.72433	96	.97275	.98310
47	.59937	.73083	97	.97972	.98742
48	.60800	.73716	98	.98650	.99153
49	.61657	.74350	99	.99335	.99566
50	.62500	.75000	100	1.00000	1.00000

TABLE 7 *(Continued)*

Depth in ft.	*Coef. d* 62.5%	*Coef. d* 75.0%	*Depth in ft.*	*Coef. d* 62.5%	*Coef. d* 75.0%
101	1.007	1.004	151	1.322	1.187
102	1.011	1.008	152	1.328	1.190
103	1.017	1.012	153	1.334	1.193
104	1.026	1.016	154	1.340	1.196
105	1.033	1.020	155	1.346	1.199
106	1.040	1.024	156	1.351	1.203
107	1.046	1.028	157	1.357	1.206
108	1.053	1.032	158	1.363	1.209
109	1.060	1.036	159	1.369	1.212
110	1.066	1.040	160	1.375	1.215
111	1.073	1.044	161	1.381	1.219
112	1.079	1.048	162	1.386	1.222
113	1.086	1.052	163	1.392	1.225
114	1.090	1.056	164	1.398	1.228
115	1.099	1.060	165	1.404	1.231
116	1.105	1.064	166	1.410	1.234
117	1.112	1.067	167	1.415	1.237
118	1.118	1.071	168	1.421	1.240
119	1.125	1.074	169	1.427	1.243
120	1.131	1.079	170	1.433	1.246
121	1.138	1.082	171	1.438	1.249
122	1.144	1.086	172	1.444	1.253
123	1.150	1.090	173	1.450	1.256
124	1.157	1.093	174	1.455	1.258
125	1.163	1.097	175	1.461	1.261
126	1.169	1.101	176	1.467	1.265
127	1.175	1.104	177	1.472	1.268
128	1.182	1.108	178	1.478	1.270
129	1.188	1.112	179	1.484	1.273
130	1.194	1.115	180	1.489	1.276
131	1.200	1.119	181	1.495	1.279
132	1.207	1.122	182	1.500	1.282
133	1.219	1.126	183	1.506	1.285
134	1.223	1.129	184	1.512	1.288
135	1.225	1.133	185	1.517	1.291
136	1.231	1.136	186	1.523	1.294
137	1.237	1.140	187	1.528	1.297
138	1.244	1.143	188	1.533	1.300
139	1.250	1.146	189	1.539	1.303
140	1.256	1.150	190	1.545	1.305
141	1.262	1.153	191	1.550	1.308
142	1.268	1.157	192	1.556	1.311
143	1.274	1.160	193	1.561	1.314
144	1.280	1.163	194	1.567	1.317
145	1.286	1.167	195	1.572	1.320
146	1.292	1.170	196	1.578	1.322
147	1.298	1.173	197	1.583	1.325
148	1.304	1.177	198	1.589	1.328
149	1.310	1.180	199	1.594	1.331
150	1.316	1.183	200	1.600	1.333

But further study of the relationship between the front and rear halves of lots by analyzing sales indicates that the constant percentage concept is not usually entirely correct. It would be found that in very shallow lots, half lots might be worth only a little more than half the value. In a retail district, while the front foot values of shallow lots might be worth 70% of the lots, the front halves of deep lots might be found to contain most of the value, perhaps nine-tenths of it. This we know to be the case in very high-class retail locations. Very deep stores do not rent at amounts which are greatly in excess of the rental prices secured for the typical depths. Thus by a study of very shallow and very deep lots we arrive at the conclusion that the percentage relationship existing between the halves of lots is not a constant, but is, rather, a variable which increases with the depths of lots. In general its variation may be assumed to be constant, however, and susceptible therefore to comparatively simple analysis.

Characteristic percentages and tables could be constructed from the percentages indicated below which indicate the approximate slopes which tables used for different kinds of properties would be. The figures in the table below are equivalent values of lots of one-half the depth:

TYPICAL DEPTH CURVE HALF-LOT PERCENTAGE VARIATIONS FOR FIVE CLASSIFICATIONS

Class of Property	*Per cent of ½ lot at 1 foot of depth*	*Per cent of ½ lot at 100 feet of depth*	*Per cent of ½ lot at 50 feet of depth*
I. High-class retail....	65	90	77½
II. Ordinary retail......	62½	85	73¾
III. Wholesale districts..	55	80	67½
IV. Apartment districts..	52	58	55
V. House districts......	52½	65	58¾

This table simply states that we are going to assume that in a wholesale district, the value of a lot 1 foot deep is 55% of the value of a lot 2 feet deep, and that the value of a lot 100 feet deep is 80% of the value of a lot 200 feet deep, and further that the values of all other "half-lots" bear percentage relationships to the values of whole lots in direct proportion, between the 55% and the 80%, to depth.

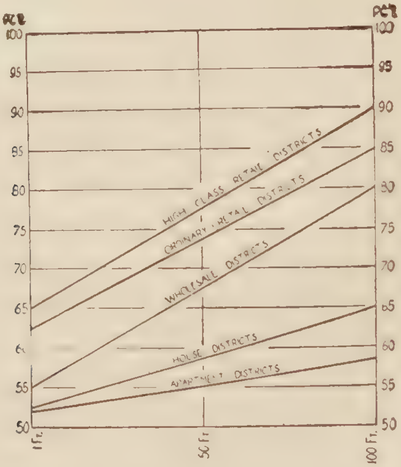


FIGURE 23: HALF-LOT PERCENTAGE VARIATIONS
The typical depth curve half-lot percentage variations for five district classifications adopted in computing the tables presented in this book.

Hence each of the six classifications would be tabulated, letting the percentages increase between the limits stated in direct proportion to the depth increases. Take the high-class retail case for illustration. The percentages of half-lot values range from 65% at one foot of depth to 90% at 100 feet of depth. That is, there is a range of 25% corresponding to a total depth increase of 100 feet, or 0.25% for each foot of increase. The table therefore increases between the selected limits at the constant rate of 0.25% per foot.

TABLE 8

Percentage Variations: High-Class Retail

Depth	%	*Depth*	%	*Depth*	%	*Depth*	%
1	65.00	26	71.25	51	77.50	76	83.75
2	65.25	27	71.50	52	77.75	77	84.00
3	65.50	28	71.75	53	78.00	78	84.25
4	65.75	29	72.00	54	78.25	79	84.50
5	66.00	30	72.25	55	78.50	80	84.75
6	66.25	31	72.50	56	78.75	81	85.00
7	66.50	32	72.75	57	79.00	82	85.25
8	66.75	33	73.00	58	79.25	83	85.50
9	67.00	34	73.25	59	79.50	84	85.75
10	67.25	35	73.50	60	79.75	85	86.00
11	67.50	36	73.75	61	80.00	86	86.25
12	67.75	37	74.00	62	80.25	87	86.50
13	68.00	38	74.25	63	80.50	88	86.75
14	68.25	39	74.50	64	80.75	89	87.00
15	68.50	40	74.75	65	81.00	90	87.25
16	68.75	41	75.00	66	81.25	91	87.50
17	69.00	42	75.25	67	81.50	92	87.75
18	69.25	43	75.50	68	81.75	93	88.00
19	69.50	44	75.75	69	82.00	94	88.25
20	69.75	45	76.00	70	82.25	95	88.50
21	70.00	46	76.25	71	82.50	96	88.75
22	70.25	47	76.50	72	82.75	97	89.00
23	70.50	48	76.75	73	83.00	98	89.25
24	70.75	49	77.00	74	83.25	99	89.50
25	71.00	50	77.25	75	83.50	100	89.75

To construct the depth table the method is as follows: Assume the value of a lot 1 foot deep to be 1000 units. Then we know that this amount is 65% of the value of the 2-foot lot. The value of the 2-foot lot is then 1538 units. From the table we know that the value of a 2-foot lot is 65.25% of the value of a 4-foot lot, and so on, thus:

Depth	*Per cent at depth*	*Value*
1	65.00	1000
2	65.25	1538
4	65.75	2357
8	66.75	3585
16	68.75	5371
32	72.75	7811
64	80.75	10737
128	——	13297

These values and depths are then plotted on a very large sheet of finely graphed paper and a smooth curve drawn through the points, thus:

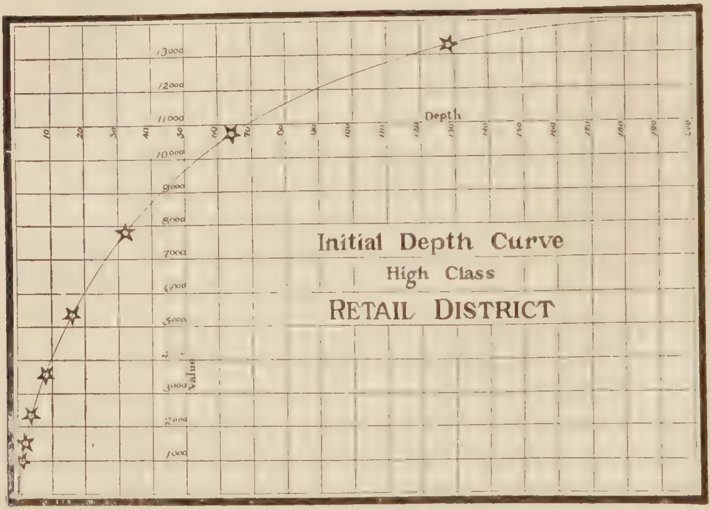


Figure 24
Initial Depth Curve

The values corresponding to each foot of depth can then be read from the curve. Only those values which cannot be computed by resort to the table of percentage variations will be taken from the curve itself. Thus the value at 3 feet of depth, at 5, 7, 9 and 11, would probably all be taken from the curve. Beyond this point, interpolation or an analysis of the differences between successive items will be found to be quicker, easier and more accurate.

The items in the table of values thus secured are then divided by the value found for the lot 100 feet deep (or any other depth selected for a standard), the result being a table of equivalent percentages of value for lots of the various depths, and the rate of fall in the increments controlled by the varying percentages assumed. This latter operation is indicated below:

COMPUTATION OF DEPTH TABLE FROM TABLE OF INITIAL VALUES

Depth	*Initial Values*	*Depth Table 100′ Standard dividing by* 12520	*Depth Table 125′ Standard dividing by* 13234
1	1000	.07987	.07556
2	1538	.12284	.11622
3	1975	.15775	.14924
4	2357	.18826	.17810
5	2701	.21573	.20410
....	.....	....	....
11	4327	.34561	.32696
....	.....	....	....
42	8929	.71317	.67470
....	.....	....	....
50	9672	.77252	.73084
....	.....	....	....
99	12484	.99712	.94333
100	12520	1.00000	.94605
101	12555	1.00279	.94869
....	.....	....	....
125	13234	1.05703	1.00000
200	13950	1.11422	1.05410

This indicates the method used in computing fluctuating percentage depth tables. The five depth tables suggested above are given in the following tabulations, and it is understood that by this method any desired fluctuation can be introduced to meet any requirements for depth tables. It is also to be understood that there is no reason why, for some purposes, depth tables could not be computed in which the fluctuating percentages did not vary constantly, but rather followed some accelerating relationship. In any event the selection of the fluctuating percentages and the law to control the fluctuations can be based upon discretion in the effect produced by halving lots.

TABLE 9

DEPTH COEFFICIENTS

Depth in Feet	*High-class Retail District*	*Ordinary Retail District*	*Wholesale District*	*Apartment District*	*House District*
5	.216	.178	.111	.065	.076
10	.327	.281	.198	.126	.143
15	.414	.365	.275	.183	.207
20	.486	.436	.346	.239	.267
25	.548	.499	.410	.294	.325
30	.604	.555	.470	.347	.381
35	.653	.606	.526	.399	.435
40	.697	.653	.578	.450	.488
45	.736	.696	.627	.500	.538
50	.773	.735	.672	.549	.586
55	.806	.771	.715	.598	.634
60	.836	.805	.755	.645	.680
65	.863	.836	.793	.692	.724
70	.888	.865	.829	.738	.767
75	.911	.891	.862	.783	.809
80	.932	.916	.893	.828	.850
85	.952	.939	.922	.872	.889
90	.969	.961	.950	.915	.927
95	.985	.981	.976	.958	.964
100	1.000	1.000	1.000	1.000	1.000
105	1.014	1.017	1.023	1.042	1.035
110	1.026	1.033	1.044	1.082	1.069
115	1.037	1.048	1.064	1.122	1.103
120	1.048	1.062	1.083	1.162	1.135
125	1.057	1.075	1.101	1.200	1.166
130	1.065	1.087	1.117	1.239	1.197
135	1.073	1.098	1.133	1.277	1.226
140	1.080	1.108	1.147	1.314	1.255
145	1.086	1.117	1.161	1.351	1.283
150	1.091	1.126	1.173	1.387	1.310
155	1.096	1.134	1.184	1.423	1.337
160	1.100	1.141	1.195	1.459	1.362
165	1.103	1.148	1.205	1.494	1.387
170	1.106	1.154	1.214	1.529	1.411
175	1.109	1.159	1.222	1.563	1.435
180	1.111	1.164	1.230	1.596	1.458
185	1.112	1.169	1.237	1.630	1.479
190	1.113	1.173	1.243	1.662	1.500
195	1.114	1.177	1.249	1.694	1.521
200	1.114	1.180	1.254	1.726	1.541

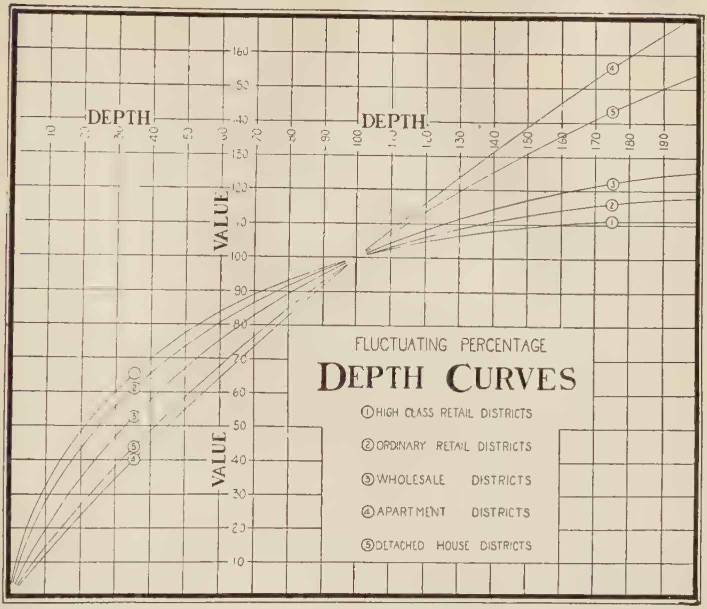


Figure 25: The Five Depth Curves
Depth variations are represented from left to right. The corresponding values are represented by the heights of the curves.

By recourse to these depth tables the values of inside lots can be found by the formula:

$$V = F \times B \times \text{Coef. } d$$

where V = value, F = frontage, B = the unit street value and d = depth. Coef. d is the equivalent value coefficient selected directly from the depth table.

This is value integration, in which the base value is a known, and in which the total value of the lot is the unknown.

Given the value of a vacant inside lot, the unit street value is found by the formula:

$$\frac{V}{F \times \text{Coef. d}}$$

This is value disintegration, in which the lot value is known, and in which the base value is unknown and desired.

For example, suppose the unit street value is $210, and that we wish to calculate a value for a lot 62′ x 171′ in an ordinary retail commercial district.

$$V = 62 \times 210 \times 1.15504 = \$15{,}038.62.$$

Then suppose that a vacant inside lot has sold for $14,500 in a wholesale district. Its size is 45′ x 125′ and we wish to know what unit street value is indicated by the sale.

$$B = \frac{14{,}500}{45 \times 1.1007} = \$292.74$$

Methods of Corner Computation.—In creating a system for making allowances for the additional values of corner lots we can make the following assumptions:

1. That the mere fact of corner location will give any lot a higher value than the value of a lot of identical size in the middle of the block.
2. That the total value of a corner lot will be the sum of the values produced by each street, and that no system can be correct which requires the selection of one of the frontages as such in the method.
3. That the value of the corner lot will be a function of the unit street values of both of the streets.
4. That the system created must be capable of application in different cities and in different districts and characters of property, by the substitution of differential quantities.

5. That no corner lot will be worth more than the amount which would be represented by the sum of the values of two inside lots, one on each street.

From the latter assumption we may make a corner formula by letting $V = (V_1 + V_2)$ represent the maximum value of any corner lot, in which V_1 is the value of an inside lot of same dimensions on one of the streets, and V_2 such a value on the other street. Then $V_1 + V_2$ may be made smaller by multiplying by a fraction, which fraction would include allowance for the relative amounts of the two unit street values, and would include the differentials which make the formula applicable to different kinds of districts. The formula could then be stated thus:

$$V = (V_1 + V_2)\left[W_1 \frac{(\quad V_1 \quad)}{(V_1 + V_2)} + W_2 \frac{(\quad V_2 \quad)}{(V_1 + V_2)} \right]$$

The ratios $V_1/V_1 + V_2$ and $V_2/V_1 + V_2$ indicate the relative importance of the two assumed inside lots in giving additional value to the corner lot. W_1 and W_2 are the district differentials, and will be made to vary in accordance with the extent to which corners are more available in use in various kinds of districts. These amounts will be high in retail districts and very low in residential districts, and are adjusted in this manner to suit the conditions of the district. Should one have the opinion that a lot might have a higher value than $V_1 + V_2$, the formula could still apply by letting the W items be larger than 1.

The corner formula reduced to simpler terms may be indicated thus:

$$V = W_1 V_1 + W_2 V_2$$

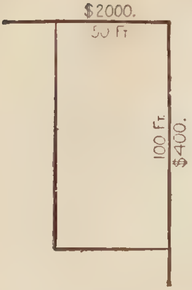


FIGURE 26

$(V_1 + V_2)$ is found in the following manner:

$$\begin{aligned} V_1 &= 50 \times 2000 \times 1.00 = \$100{,}000 \\ V_2 &= 100 \times 400 \times .549 = 21{,}960 \\ V_1 + V_2 &= \$121{,}960 \end{aligned}$$

To illustrate the use of the corner formula given, let us continue the example above and use the following district differentials.

High class retail districts,	let W =	1.00
Ordinary " "	let W =	.90
Wholesale "	let W =	.78
Apartment "	let W =	.82
House "	let W =	.65

Then if the $2,000 street is in an ordinary retail district and the $400 street is a part of an apartment district, we have:

$$V = .9\ (100{,}000) + .82\ (21{,}960)$$
$$V = \$108{,}007$$

Another example, in which the $1,250 street is an ordinary retail street and the $950 street is part of a wholesale district:

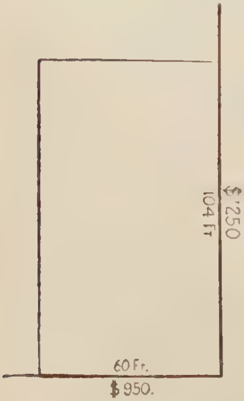


FIGURE 27

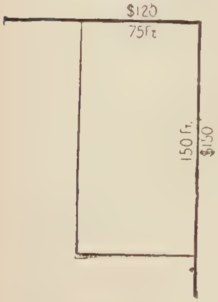
$$\begin{aligned} V_1 &= 60 \times 950 \times 1.018 = \$\ 58{,}026 \\ V_2 &= 104 \times 1250 \times .805 = 104{,}650 \\ V_1 + V_2 &= \$162{,}676 \end{aligned}$$

$$V = .78\ (58026) + .9\ (104650)$$
$$V = \$139{,}445$$

When both of the streets are of the same character the formula reduces into comparatively simple form. In such cases $W_1 = W_2$ and the differential for district character may be represented by W. The formula becomes:

$$V = W\ (V_1 + V_2)$$

Thus when the districts are alike the computation is not very involved. Assume a case where both streets are in a house district.



$$V_1 = 75 \times 120 \times 1.310 = \$11,790$$
$$V_2 = 150 \times 150 \times .809 = 18,203$$
$$V_1 + V_2 = \$30,993$$
$$V = .65 \times \$30,993 = \$20,145$$

FIGURE 28

Computation of Corner Reflection.—Lots which are close to street intersections have frequently higher values than ordinary inside lots. The increment of value added for this corner reflection will not bear any relation to the method used in computing the values of corner lots because corner lots enjoy direct access from both streets, while inside lots close to corners have access from only one of the streets, and secure their additional value only from proximity to the people on the cross street. Obviously the system created for the allowance to be made for corner reflection will involve: (1) The distance from the cross street to the lot, (2) the unit street value of the cross street, (3) regard for the character of district which the cross street involves, (4) the size and shape of the lot, and (5) the initial value of the lot calculated as an ordinary inside lot without allowance for corner reflection.

As has been already indicated the distance to the cross street is best measured from the corner to the middle point in the frontage of the lot. Let this distance be represented by r. Let B_1 and B_2 represent the unit street values on the street on which the lot fronts and on the cross street respectively. Let W_2 represent the district differential for the district or character of district in which the cross street lies. Then the value of an inside lot enjoying corner reflection will be equal to the value of an inside lot without such reflection ($V = F \times B_1 \times \text{coef. d}$) plus an increment of value derived from the cross street.

The increment of value derived from the cross street operates when it reaches the lot through the actual frontage of the lot and to its actual depth. The value may be considered as "entering" over the actual frontage. The unit which measures the value of the cross street will be B_2. Hence the amount of the reflected value will be ($F \times B_2 \times \text{coef. d}$) diminished gradually as r increases, and further diminished by W_2 to allow for the lesser importance of such reflection from certain characters of cross streets. Thus we may state the formula which gives the total value of an inside lot close to a street intersection as follows:

$$V = (F \times B_1 \times \text{coef. d}) + W_2 \times (\text{coef. r})\ (F \times B_2 \times \text{coef. d})$$

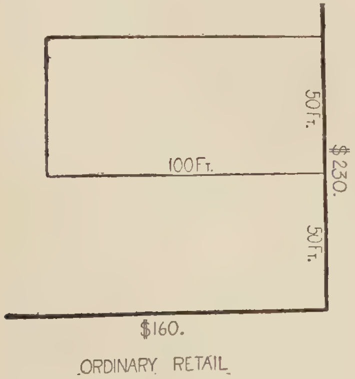
In putting the correct quantities into this equation, W_2 can be the same set of district differentials used in the computation of corner lots, and coef. r can be made a single table in which the amounts of coef. r diminish rapidly as r, the distance to the street intersection, increases. A suggested table of quantities for such a table follows:

CORNER REFLECTION COEFFICIENTS

r equals the distance in feet from the corner to the middle point in the frontage of the lot.

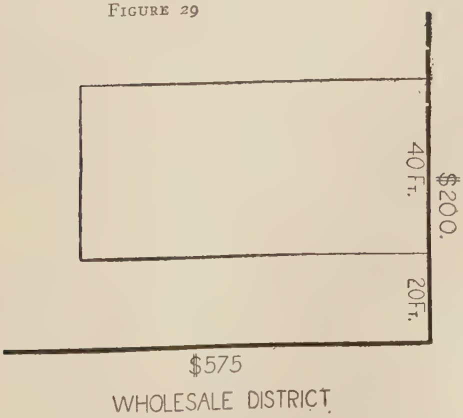
r	*Coef. r*	*r*	*Coef. r*	*r*	*Coef. r*
15	.500	50	.174	85	.063
20	.414	55	.154	90	.053
25	.350	60	.134	95	.044
30	.300	65	.117	100	.038
35	.260	70	.102	105	.032
40	.226	75	.087	110	.027
45	.199	80	.074	115	.022

The application of the use of this formula can be shown by a few illustrations.



$$V =$$
$$(50 \times 230 \times 1.00)$$
$$+ (0.9)\ (0.087)$$
$$\times (50 \times 160 \times 1.00)$$
$$V = \$12{,}126.40$$

FIGURE 29



$$V =$$
$$(40 \times 200 \times .89325)$$
$$+ (0.78)\ (0.226)$$
$$\times (575 \times .89325)$$
$$V = \$10{,}768.14$$

FIGURE 30

The existence of the corner reflection value is the result of the presence of additional people close by on the cross street. There is another possible source of reflected value, namely the fact that ultimately the inside may actually come into the same ownership as the corner and receive direct access to the people on the cross street and the plottage value resulting from the combination.

Method of Plottage Allowance.—Plottage is the value which results directly from the greater availability of larger areas. The source of the value is found in greater construction possibilities and in the savings incident to the management and operation of more efficient and larger building units. In creating a system to make allowance for the plottage increment, the areas of various lots can be made to be the basis of calculation, and the actual frontage dimension can be used, inasmuch as area (in rectangular lots) varies in direct ratio with changes in the frontage dimension.

Very narrow lots are almost unavailable for any really practical utilization. The minimum amount of frontage which lends itself readily to profitable development will differ in different kinds of districts. For example, in a high-class retail district narrow lots, no larger than fifteen feet, would be capable of profitable development. On the other hand, in a district of apartments, a fifteen-foot lot would be almost useless for any real development. Thus in very narrow lots, the growth of value due to combination or increased frontage is very rapid. In ordinary sizes of lots plottage value is less considerable, and in larger lots, additional frontage does not add value in greater than direct proportion to the frontage increases. This will indicate then the general direction which plottage increments will take, and tables of plottage values corresponding to frontage can be made, each one corresponding to the conditions of plottage in any given kind of district. Such tables will be tables of F (the frontage of the lot in feet) and equivalent amounts to use in place of F (that is, F equiv.).

Some reference to the unit street value is again necessary here. It was defined as the value of 1 ft. x 100 ft. selected from a lot of ordinary size in the middle of the block. Unit values should be selected from the lot of small size which is readily available for correct development. In downtown commercial property, the unit value would be 1/40th of the value of a lot 40 x 100 in the middle of the block. In a district of individual houses the unit value would be 1/35th of the value of a lot 35 x 100 in the middle of the block. In a wholesale district the unit value might be 1/100th of the value of a lot 100 x 100 in the middle of the block. Then in the creation of the plottage table, the table will provide equivalent amounts to use in place of the actual frontages, and these amounts will be smaller than the actual frontage if the lot is narrower than the typical width of lot available in the district, and larger than the actual frontage if the lot is wider than the small lot which is actually available for profitable building development.

A suggested plottage table follows, in which the unit street values are assumed to have been selected from typical small lots as follows:

High-class retail district	35 foot lot
Ordinary retail district	30 foot lot
Wholesale district	50 foot lot
Apartment district	50 foot lot
Individual house district	40 foot lot

It will be noticed that the tables provide that the lots of this size have F and (F equiv.) equal, and that the other values are variations from these equivalents.

TABLE 10

Plottage Tables

Frontage Equivalents

Frontage in Feet	*High-Class Retail District*	*Ordinary Retail District*	*Wholesale District*	*Apartment District*	*House District*
5	3.4	3.4	2.6	2.6	2.9
10	8.3	8.1	6.7	6.5	7.2
15	13.3	13.2	11.3	11.1	12.3
20	18.3	18.8	16.4	16.2	17.4
25	23.9	24.4	21.5	21.4	23.1
30	29.5	30.0	27.2	27.1	28.9
35	35.0	36.0	32.9	32.8	33.5
40	40.5	42.0	38.7	38.2	40.0
45	46.1	47.8	44.3	44.4	45.9
50	51.8	53.6	50.0	50.0	51.7
55	57.6	59.3	56.1	56.1	57.6
60	63.3	65.1	62.3	62.1	63.5
65	68.9	71.1	67.8	68.2	69.0
70	74.5	77.1	73.4	74.2	74.4
75	80.1	83.1	79.4	80.3	79.7
80	85.6	88.1	85.6	86.3	84.9
85	91.1	94.8	91.6	91.7	90.2
90	96.6	100.5	97.6	97.2	95.7
95	102.1	106.2	103.3	102.6	101.0
100	107.6	111.9	109.0	108.1	106.5
105	113.1	117.3	115.1	113.9	112.0
110	118.6	122.8	121.3	119.5	117.5
115	124.0	128.3	127.5	125.1	123.0
120	129.4	133.8	133.7	130.7	128.5
125	134.7	139.6	139.2	136.3	133.6
130	140.0	145.4	144.7	141.9	138.8
135	145.4	151.2	150.0	147.4	144.0
140	150.7	157.0	155.5	153.0	149.2
145	156.0	162.6	161.1	158.6	154.4
150	161.4	168.3	166.7	164.2	159.5
155	166.7	173.9	172.6	169.8	164.7
160	172.0	179.6	178.4	175.4	169.8
165	177.4	185.1	184.1	180.9	175.1
170	182.6	190.7	190.0	186.5	180.6
175	187.9	196.3	196.2	192.1	186.0
180	193.2	201.8	202.3	197.7	191.4
185	198.7	207.3	207.7	203.3	196.7
190	204.2	212.8	213.0	208.8	202.0
195	209.7	218.3	218.0	214.4	207.5
200	215.2	223.8	223.0	220.0	213.0
205	220.7	229.3	228.0	225.5	218.3

To illustrate the use of this table, assume a lot to be 75′ x 123′ in a wholesale district. Where heretofore we have used F as the actual frontage, we now use (F equiv.) in its place as an allowance factor for plottage. Assume the unit street value to be $410.

$$V = (\text{F equiv}) (\text{B}) (\text{Coef. d})$$
$$V = (79.4) (410) (1.09374)$$
$$V = \$35{,}605.61$$

When several smaller lots are combined to form a single large lot, the amount of the plottage increment can be measured by recourse to the tables of frontage equivalents. For example, suppose three lots, each 123 feet deep in a wholesale district, have frontages respectively of 20 feet, 30 feet and 55 feet. Suppose also that the unit street value is $410. Then the values of the lots in succession are:

Lot 20′ x 123′..............	$ 7,354.31
Lot 30′ x 123′..............	12,197.39
Lot 55′ x 123′..............	25,157.11
Total separated value......	$44,708.81

When combined into one lot an increment of value arises which is attributable directly to the combination, thus:

Lot 105′ x 123′.............	$51,614.68

The difference between the two values, or $6,905.87, is the actual amount of the plottage. When comparatively large lots are combined into still larger lots the amount of plottage created will be proportionally less. Take for instance the combination of two lots, each 50′ x 125′, in an ordinary retail district with a unit street value of $1,000, into one lot 100′ x 125′.

Lot 50′ x 125′.............	$ 57,608.21
Lot 50′ x 125′.............	57,608.21
Total separated value....	$115,216.42
Lot 100′ x 125′.............	$120,267.88
Plottage increment	5,051.46

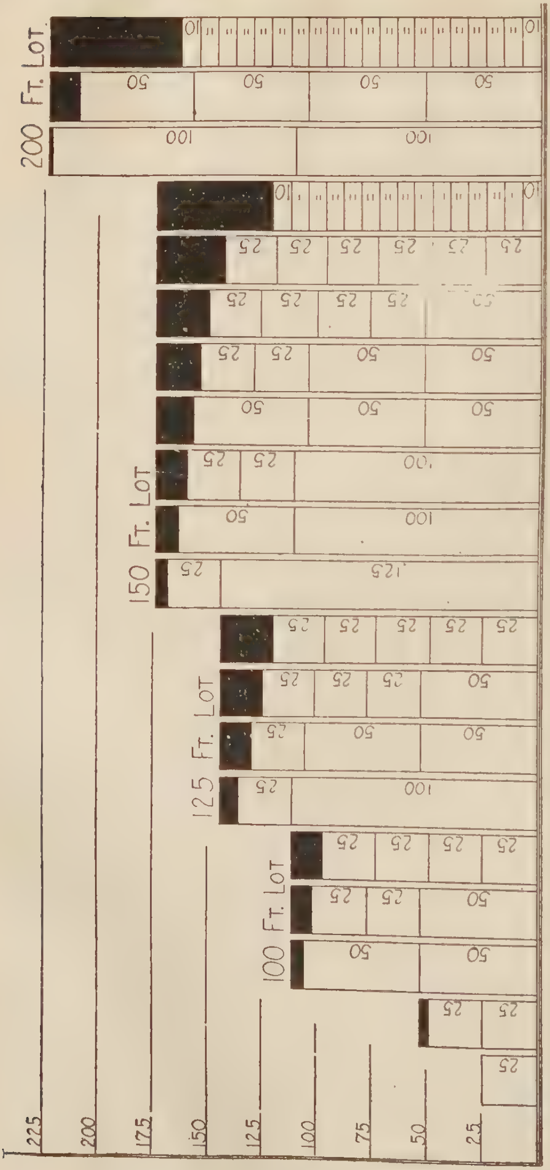


FIGURE 31: PLOTTAGE CONCEPT

The heights of the columns in this diagram represent the unit values of lots of various frontages in ordinary retail districts. The amounts of plottage created by the combination or assembly of smaller lots to make the large lots are indicated in black.

Alleys, Street Width, and Irregular Shapes.—The development of systems for very peculiar situations, such as the presence of alleys, variations from ordinary street widths, and for the computation of values of very irregularly shaped lots, is believed to be a violation of the fair application of such systems of comparative value. The systems of comparative value can have no application except for use in cases of typically shaped and typically located lots. The very unit street values are secured from the typical situations and the integration of lot values for very irregularly shaped lots cannot be a proper application of the units. Nevertheless, there are some such irregular problems which might involve such comparative analysis. The presence of ordinary alleys on the sides or along the rear of lots can be reduced to system inasmuch as it is an instance which occurs with sufficient frequency to be general. Certain kinds of irregular shapes can be solved by the methods also, but no elaborate schemes can be proper.

Consider first of all the presence of alleys along the sides of lots. The alley will usually add to the value of the adjacent lot because of the additional access afforded and the additional light and air provided. The amount of value which it will add will depend upon the size of the alley and upon the relation between its size and the size of the lot. An alley of a given size will add less proportionally to the value of a large lot than it will to a small lot, but will add greater absolute value to the larger lot. In this respect the alley exactly corresponds to the value additions secured by virtue of the corner location of a lot, except that no importance is given to the idea of a base "unit alley value." Rather the alley adds value because of its area and in relation to the unit street values of the lot. It has already been indicated that the value added by an alley will be a function of the ratio of the area of the alley to the area of the lot, and of the actual width of the alley. The district differential will also be introduced in the formula because it is clear that alleys will add very much more to lot values in a wholesale district where there is considerable shipping than in a retail commercial district. And in residential district, it is debatable whether some alleys can be said to add anything whatsoever to the lot value. In fact they may be actually harmful in a district of individual homes, although for purposes of tax assessing, no damaging amount would probably be ascribed to a side alley. The following formula is therefore suggested for use in computing the amount of value which a lot, having a side alley along it will have. Note that the formula, as stated, gives the total value of an inside lot having an alley, not the alley addition alone.

$$V = (\text{F equiv.}) \times (B) \times (\text{coef. d}) + W \times B \times \text{coef. d}\left[\frac{F \times d}{Z \times Y} + K \times Z\right]$$

If the amount of value added by the presence of the alley is A, then:

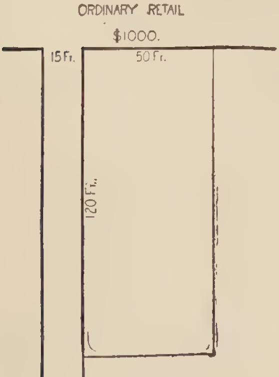
$$A = W \times B \times \text{coef. d}\left[\frac{F \times d}{Z \times Y} + K \times Z\right]$$

In the above formula Z is the width of the alley, and Y is the length of the alley along the lot, hence Z × Y is the total area of the alley. The K is a constant number which provides a means of introducing the relative importance of alley width and the relationship of alley and lot areas in the constitution of the amount of value which an alley produces. If K is large the width of alley is made to be of greater importance than the area relationship, and if K is small the light and air element is considered to be of more importance in the construction of the value than is the importance of access. Thus in a wholesale dsitrict K would be larger than in a retail commercial district, and so on.

The following amounts are suggested for the W and the K, in various kinds of districts:

Character of District	*District Differential* W	*Access vs. Air Factor* K
High-class retail	.04	2
Ordinary retail	.06	2
Wholesale district	.08	4
Apartment district	.05	2
Individual houses	.03	1

An example to illustrate the use of the formula follows.



$$V = (53.6 \times 1000 \times 1.062) + (.06)\ (1000)\ (1.062) \times \left[\frac{6000}{1800} + 2 \times 15\right]$$

$$V = \$59{,}047.$$

FIGURE 32

The situation as it concerns rear alleys is not different. Where an alley extends the entire length of the block, it is an element of value which may be said to affect the values of all of the lots similarly, and is therefore already included in the selected unit street value. Thus where the ordinary rear alley exists, no formula seems necessary or desirable. The increment produced has been provided for in the unit street value which includes all common elements contributing to lot value. Where a rear alley is a unique element of value the unit street value would include no allowance for it and a system might be devised for this purpose. The formula would be the same one used for the side alley, but the amounts substituted for W and K would be different. In the cases of "dead end alleys" behind lots, the following quantities might be made to apply for W and K in various districts:

	W	K
High-class retail	.03	1
Ordinary retail	.04	1
Wholesale	.07	3
Apartments	.03	1
Individual houses	.03	1

In lots of irregular shapes, the methods applicable provided the lots are roughly rectangular involve the finding of average dimensions and the reduction to an assumed rectangular shape for the remainder of the calculation. Thus a lot having a width of 50 feet running back to a depth of 125 feet on one side and a depth of 145 feet on the other would be computed as though it were a rectangular lot 50 x 135. A lot having a frontage of 60 feet and a depth of 125 feet, but which widened as it became deeper to a width of 80 feet in the rear, could be computed as though it were a rectangular lot 70 x 125. In this case, however, we would get the same result as when the lot was 80 feet in front, narrowing to 60 feet in the rear. Obviously the latter lot should be the more valuable. Hence we would probably devise a system in which the former lot were computed as the value of a rectangular lot 65 x 125, and the latter as the value of a rectangular lot 75 x 125.

Similar devices can be devised for the computation of the values of lots having frontage on three streets, corners which are not right angles, triangular lots, etc.

When such comparative value systems are to be utilized by tax assessors it will frequently be found that a single unit street value will not apply throughout the entire length of a block, but that there is a diminution in value from one end of the block to the other. In such cases the unit street value may be expressed as ranging from a high level at one corner to a low level at the other and the assumption made that there is a gradation in front foot values along the street. The actual unit street value used in appraising particular lots along the street will be selected with reference to the proportionate distance between the corners and the middle points of the lots can be taken in the measurement of such distances. In appraising lots A, B, C and D in the accompanying plat the unit street values used would be:

A = $888
B = 824
C = $768
D = 720

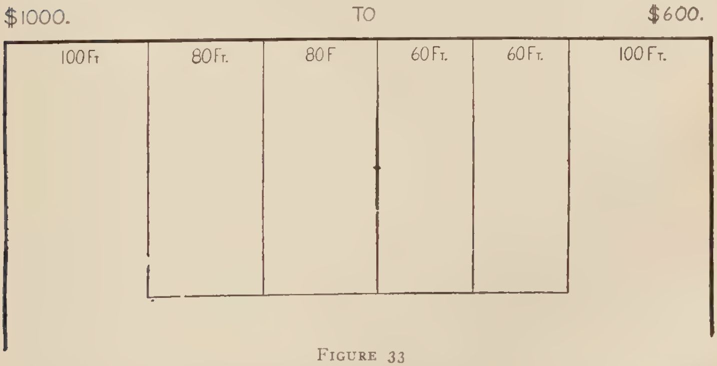


Figure 33

In the use of these formulae they are combined where the different elements, for which allowance systems have been given, are present. The following illustration is simply a very complicated one to show most of the elements which have been discussed. In the example, note the variation of the final value of the lot, from the value derived from the assumption that the lot is an isolated inside lot on the higher value street ($63,416).

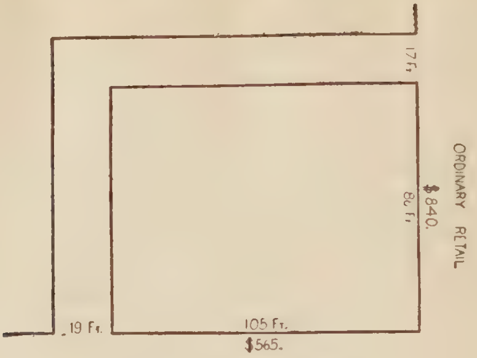


FIGURE 34

$$V = W_1\Big[(\text{F equiv}_1)\ (B_1)\ (\text{Coef. } d_1)\Big] + W_2\Big[(\text{F equiv}_2)\ (B_2)\ (\text{Coef. } d_2)\Big] + (W_1)\ (B_1)\ (\text{Coef. } d_1\left[\frac{F_1 \times d_1}{Z_1 \times Y_1} + K \times Z_1\right]$$

$$+ (W_2)\ (B_2)\ (\text{Coef. } d_2)\left[\frac{F_2 \times d_2}{Z_2 \times Y_2} + K \times Z_2\right]$$

$$V = .9\Big[(95.9)\ (840)\ (1.01729)\Big] + .78\Big[(115.1)\ (565)\ (.92805)\Big]$$

$$+ (.06)\ (840)\ (1.01729)\left[\frac{86 \times 105}{17 \times 105} + 2 \times 17\right]$$

$$+ (.08)\ (565)\ (\ .92805)\left[\frac{105 \times 86}{19 \times 86} + 4 \times 19\right]$$

Solving this equation we find the total value of the lot to have been $126,252.

The values added by the alleys were:

$$A_1 = \$2002.65 \text{ and } A_2 = \$3420.02$$

The total value of the lot had there been no alleys was $120,828.86.

This example serves to show the combination of the various formulæ when a number of such elements operate upon the value of a single lot. In a similar manner each of the formulæ can be utilized and should be utilized in the process of disintegration to secure a unit street value from a reported sale consideration. For illustration let us suppose that the lot illustrated below has been sold for $196,000, and we have established a unit street value on the neighboring intersecting street of $400. Then we are able to determine what unit street value on the block on which the lot fronts is indicated by the sale.

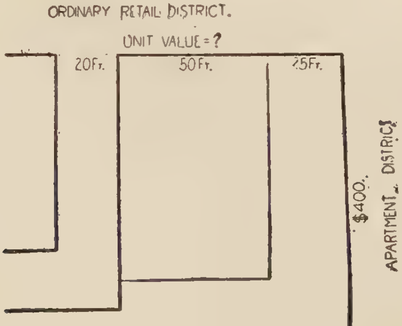


FIGURE 35

$$\begin{aligned} V = {} & \left[(\text{F equiv})\,(B_1)\,(\text{Coef. d})\right] + (W_2 \text{ Coef. r}) \times \\ & \left[(\text{F equiv})\,(B_2)\,(\text{Coef. d})\right] + (W_1)\,(B_1)\,(\text{Coef. d}) \times \\ & \left[\frac{F \times d}{Z \times Y} + K \times Z\right] \end{aligned}$$

$$\begin{aligned} \$196{,}000 = {} & \left[(53.6)\,(B_1)\,(.89118)\right] + (.143) \times \\ & \left[(53.6)\,(400)\,(.89118)\right] + (.06)\,(B_1)\,(.89118) \times \\ & \left[\frac{50 \times 75}{20 \times 75} + 2 \times 20\right] \end{aligned}$$

That is, this particular sale would indicate that the unit value on the retail street $3862.

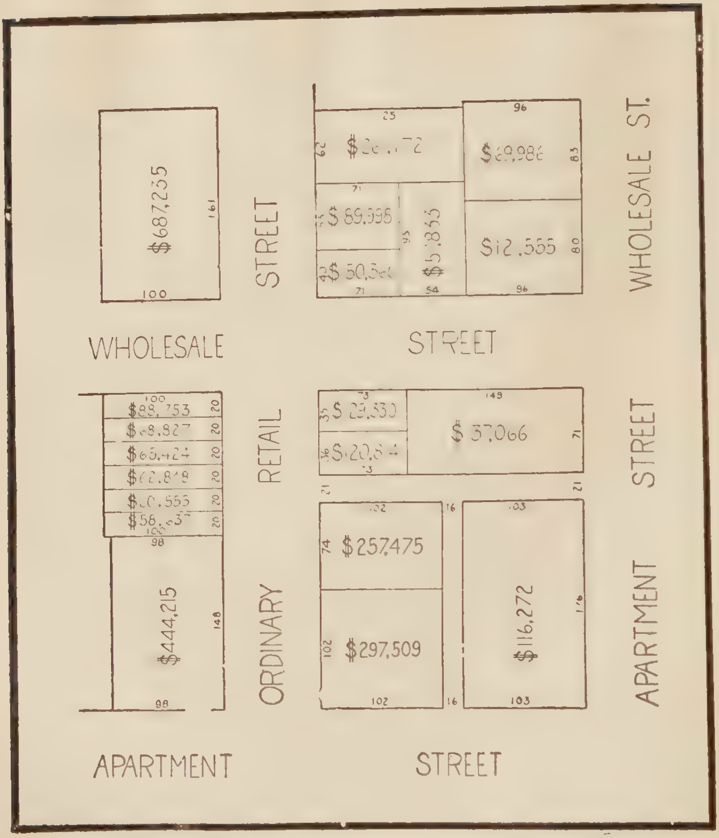


FIGURE 36: PRACTICE PLAT

Th values of the lots are shown on this plat. The reader may test his ability to use the comparative value formulas by finding the unit street values. The unit street values are shown in Figure 37.

COMPARATIVE EVALUATION OF BUILDINGS

A system of comparison for building values is of great assistance to the appraiser and tax assessor. Such a system is based upon square foot and cubic foot construction cost units and various sizes and types of building construction are classified. Thus unit costs of constructing

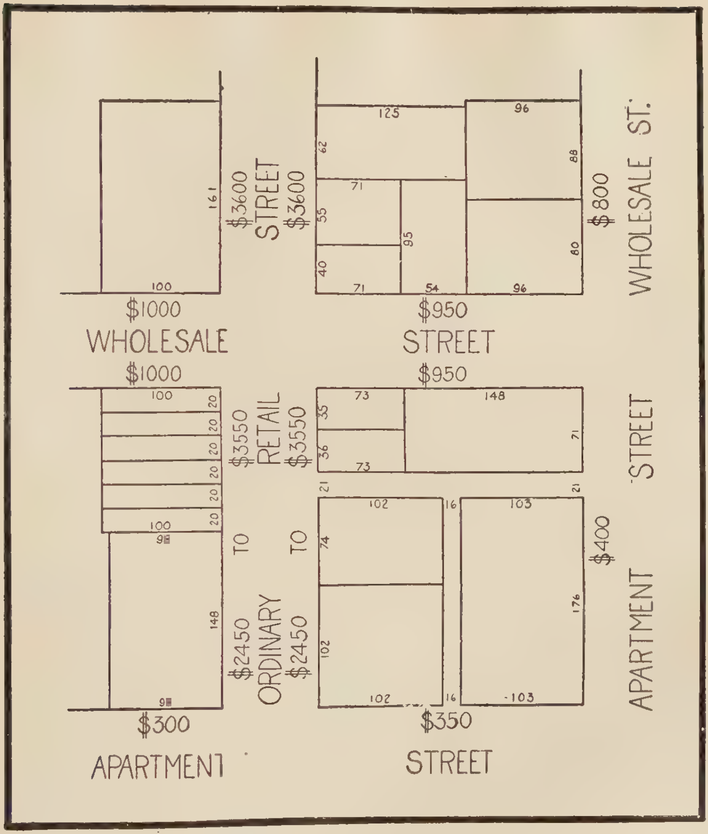


FIGURE 37: PRACTICE PLAT

The unit street values are shown on this plat. The reader may test his ability to use the comparative value formulas by finding the lot values. The lot values are shown in Figure 36.

the various kinds of buildings are studied and brought to date from time to time and new styles of construction added to the classification. Perhaps the most excellent set of building schedules of this character which is in existence at the present time is the admirable classification used in Cleveland.

WORKING TABLES AND FORMULAS

SELECTION OF PROCESSES

TOTAL VALUATIONS OF IMPROVED PROPERTIES

PROPERTY CLASS	Summation Process	Comparison Process	Capitalization of Net Income	Appraisal by Income Analysis	Corresponding Typical Use
Improved Farms	Preferred	Check	Possible as a check		
Individual Family Houses	Check	Preferred			
Typical rented property; highest and best use.	Check	Check	Preferred		
Typical rented property; Not highest and best use.		Check		Preferred	
Clubs, schools, hospitals, Ry. depots, churches, public bldgs., etc; highest and and best use.	Preferred				Preferred for hotels and downtown clubs
Clubs, schools, hospitals, Ry. depots, churches, public bldgs., etc. Not correct use of land	Preferred where land is of lower values			Preferred where land is of high value	
Typical urban factory property	Check	Preferred	Check	Possible	
Specialized urban factory property	Preferred	Check when possible			

SELECTION OF PROCESSES

TO DISTRIBUTE TOTAL VALUATIONS TO LAND AND BUILDING

PROPERTY CLASS	L = Recent Transfer Process B = Cost of Construction	L = Recent Transfer B = Reproduction Cost	L = Recent Transfer B = Multiple of Rent or Annuity for Life	L = Long Time Transfer B = Reproduction Cost	Comparison and Separation	Capitalization of Net Income and Separation	Appraisal by Income Analysis and Separation
Improved Farms		Possible		Preferred	Check	Possible as a check	
Individual Family Houses	Possible	Check			Preferred		
Typical Rented Property; Highest and best use	Possible	Check			Check	Preferred	
Typical Rented Property; Not highest and best use			Preferred in lower valued properties		Possible		Preferred in high value property
Clubs, schools, depots, etc., at highest and best use	Possible	Preferred					
Clubs, schools, depots, etc., not at highest and best use		Preferred where land is of lower value					Preferred where land is of high value
Typical Urban Factory Property	Possible	Check			Preferred	Check	Possible
Specialized Urban Factory Property	Possible	Preferred			Check when possible		

VALUE EQUATION

The value of an income producing property is indicated by the formula:

$$V = \delta\left(\frac{F}{\theta}\right) - \delta\,(A + C) - \delta\theta\,(P)$$

in which:

V = the value of the property.
F = the future net income.
P = the existing net income.
C = the direct costs of constructing a new building.
A = all incidental costs of rebuilding the site.

The above formula may be expanded into the form:

$$V = \delta\left[\frac{R_f - (E + T + I + r + D)_f}{\theta}\right] - (A + C) + \delta\theta\left[R_p - (E + T + I + r + D)_p\right]$$

in which:

R_f = the future gross income.
R_p = the existing gross income.
E = operating expenses.
T = taxes and assessments.
I = insurance premiums.
r = repair bills.
D = the yearly depreciation item.

In the above formulas the symbol δ indicates an amount deferred; the symbol θ indicates an interest rate; and the symbol $\delta\theta$ indicates the present value of an annuity

VALUE EQUATION

The value of a vacant site capable of development as an income producing property is indicated by the formula:

$$V = 1\left[\frac{R_f - (E + T + I + r + D)_f}{\theta}\right] - (A + C)$$

The value of an income producing property which is improved to its highest and best use is indicated by the formula:

$$V = 1\left[\frac{R_p - (E + T + I + r + D)_p}{\theta}\right]$$

The value of land on which the building represents the highest and best use is indicated by the formula:

$$L = 1\left[\frac{R - (E + T + I + r + D)}{\theta}\right] - B$$

in which L equals the value of the land and B equals the value of the building.

The annual return on land on which the building represents the highest and best use is indicated by the formula:

$$\theta_L\,(L) = R - (E + T + I + r + D) - \theta_B\,(B)$$

in which θ_L (L) equals the annual return on the land and θ_B equals a fair rate of return on such buildings.

The value of land which is not improved to its highest and best use is indicated by the formula:

$$L = \delta\left[\frac{R_f - (E + T + I + r + D)_f}{\theta}\;B\right]$$

The annual return on land which is not improved to its highest and best use is indicated by the formula:

$$\theta_L\,(L) = \delta\left[R_f - (E + T + I + r + D)_f - \theta_B\,(B)\right]$$

OVER-IMPROVEMENT
UNDER-IMPROVEMENT
IMPROVED VALUE

TO MEASURE OVER-IMPROVEMENT

1. Find the total value as indicated by the income.
2. Find a land value by comparison.
3. Find a building value by reproduction cost.
4. Add 2 and 3: The result is the total value by summation.
5. if 4 is greater than 1, then the difference between 4 and 1 is a measure of the amount of over-improvement.

TO MEASURE UNDER-IMPROVEMENT

1. Find the total value indicated by the income which would be produced by a larger and correct improvement.
2. Find the total value indicated by the existing income.
3. The difference between 1 and 2 equals the extent to which under-improvement affects fair cash market value.
4. Find the structural value of the larger improvement.
5. Find the structural value of the existing improvement.
6. The difference between 4 and 5 equals the extent to which there is a difference in investment.
7. The difference between 3 and 6 equals the amount of improved value which has not been created because of under-improvement.

TO MEASURE IMPROVED VALUE

1. Find the total value as indicated by the income.
2. Find a land value by comparison.
3. Find a building value by reproduction cost.
4. Add 2 and 3: The result is the total value by summation.
5. If 1 is greater than 4, then the difference between 1 and 4 is a measure of the amount of improved value which has been created.

LIFE AND DEPRECIATION OF BUILDINGS

Table of Approximate Structural and Commercial Life of Different Classes of Buildings, also Annual Structural and Commercial Depreciation[1]

	Structural		*Commercial*	
Class of Building	*Life in Years*	*% of av. annual depreciation*	*Life in Years*	*% of av. annual depreciation*
Cheap detached frame residence....	30-40	2.90	25	4.00
Good detached frame residence.....	40-60	2.10	35	2.90
Ordinary brick residence...........	50-75	1.65	40	2.50
Good brick and stone residence....	100-150	.83	45	2.20
		or more		
Frame tenements	25-35	3.50	27	3.17
Brick tenements and flats..........	40-50	2.25	35	2.90
Good class apartment houses.......	50-75	1.66	45	2.20
High-class fireproof apt. houses...	75-100	1.16	45	2.20
			or more	
Cheap brick shops and dwellings...	40-50	2.25	40	2.50
Ordinary brick shops and dwellings	50-75	1.66	45	2.20
Good brick and stone stores and offices	75-100	1.15	45	2.20
High-class offices and stores of brick, stone, terra cotta and iron or steel construction	150	.83	50	2.00
			(to unknown)	

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[1] Cecil C. Evers, "The Commercial Problem in Buildings" (New York, 1914), p. 241.

DISCOUNT

The effective rate of discount (d) corresponding to the nominal rate of discount (f), when convertible m times yearly is represented by:

$$d = 1 - \left(1 - \frac{f}{m}\right)^{m}$$

The nominal rate of discount (f) corresponding to the effective rate of discount (d), when convertible m times yearly is represented by:

$$f = m\left[1 - (1 - d)^{\frac{1}{m}}\right]$$

The present value of a sum due n years hence, when S is the sum due, P its present value, and D the total discount on S, is represented by:

$$P = S\,(1 - d)^{n} = S\left(1 - \frac{f}{m}\right)^{mn}$$

The total discount on a sum due n years hence is represented by:

$$D = S\left[1 - (1 - d)^{n}\right] = S\left[1 - (1 - \frac{f}{m}{}^{mn}\right]$$

δ

PRESENT VALUE OF 1 AT COMPOUND INTEREST

$$v^n = (1 + i)^{-n}$$

n	4½%	5%	5½%	6%	6½%	7%
1	0.95694	0.95238	0.94787	0.94340	0.93897	0.93458
2	0.91573	0.90703	0.89845	0.89000	0.88166	0.87344
3	0.87630	0.86384	0.85161	0.83962	0.82785	0.81630
4	0.83856	0.82270	0.80722	0.79209	0.77732	0.76289
5	0.80245	0.78353	0.76513	0.74726	0.72988	0.71299
6	0.76790	0.74621	0.72525	0.70496	0.68533	0.66634
7	0.73483	0.71068	0.68744	0.66506	0.64351	0.62275
8	0.70318	0.67684	0.65160	0.62741	0.60423	0.58201
9	0.67290	0.64461	0.61763	0.59190	0.56735	0.54393
10	0.64393	0.61391	0.58543	0.55839	0.53273	0.50835
11	0.61620	0.58468	0.55491	0.52679	0.50021	0.47509
12	0.58966	0.55684	0.52598	0.49697	0.46968	0.44401
13	0.56427	0.53032	0.49856	0.46884	0.44102	0.41496
14	0.53997	0.50507	0.47257	0.44230	0.41410	0.38782
15	0.51672	0.48102	0.44793	0.41726	0.38883	0.36245
16	0.49447	0.45811	0.42458	0.39365	0.36509	0.33873
17	0.47318	0.43630	0.40245	0.37136	0.34281	0.31657
18	0.45280	0.41552	0.38147	0.35034	0.32189	0.29586
19	0.43330	0.39573	0.36158	0.33051	0.30224	0.27651
20	0.41464	0.37689	0.34273	0.31180	0.28380	0.25842
21	0.39679	0.35894	0.32486	0.29415	0.26648	0.24151
22	0.37970	0.34185	0.30793	0.27750	0.25021	0.22571
23	0.36335	0.32557	0.29187	0.26180	0.23494	0.21095
24	0.34770	0.31007	0.27666	0.24698	0.22060	0.19715
25	0.33273	0.29530	0.26223	0.23300	0.20714	0.18425
26	0.31840	0.28124	0.24856	0.21981	0.19450	0.17219
27	0.30469	0.26785	0.23560	0.20737	0.18262	0.16093
28	0.29157	0.25509	0.22332	0.19563	0.17148	0.15040
29	0.27901	0.24295	0.21168	0.18456	0.16101	0.14056
30	0.26700	0.23138	0.20064	0.17411	0.15119	0.13137
31	0.25550	0.22036	0.19018	0.16425	0.14196	0.12277
32	0.24450	0.20987	0.18027	0.15496	0.13329	0.11474
33	0.23397	0.19987	0.17087	0.14619	0.12516	0.10723
34	0.22390	0.19035	0.16196	0.13791	0.11752	0.10022
35	0.21425	0.18129	0.15352	0.13010	0.11035	0.09366
36	0.20503	0.17266	0.14552	0.12274	0.10361	0.08753
37	0.19620	0.16444	0.13793	0.11579	0.09729	0.08181

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PRESENT VALUE OF 1 AT COMPOUND INTEREST

(Continued)

$$v^n = (1 + i)^{-n}$$

n	4½%	5%	5½%	6%	6½%	7%
38	0.18775	0.15660	0.13074	0.10924	0.09135	0.07646
39	0.17966	0.14915	0.12392	0.10305	0.08578	0.07145
40	0.17193	0.14205	0.11746	0.09722	0.08054	0.06678
41	0.16452	0.13528	0.11134	0.09172	0.07562	0.06241
42	0.15744	0.12884	0.10553	0.08653	0.07101	0.05833
43	0.15066	0.12270	0.10003	0.08163	0.06668	0.05451
44	0.14417	0.11686	0.09482	0.07701	0.06261	0.05095
45	0.13796	0.11130	0.08987	0.07265	0.05878	0.04761
46	0.13202	0.10600	0.08519	0.06854	0.05520	0.04450
47	0.12634	0.10095	0.08075	0.06466	0.05183	0.04159
48	0.12090	0.09614	0.07654	0.06100	0.04866	0.03887
49	0.11569	0.09156	0.07255	0.05755	0.04569	0.03632
50	0.11071	0.08720	0.06877	0.05429	0.04291	0.03395
51	0.10594	0.08305	0.06518	0.05121	0.04029	0.03173
52	0.10138	0.07910	0.06178	0.04832	0.03783	0.02965
53	0.09701	0.07533	0.05856	0.04558	0.03552	0.02771
54	0.09284	0.07174	0.05551	0.04300	0.03335	0.02590
55	0.08884	0.06833	0.05262	0.04057	0.03132	0.02420
56	0.08501	0.06507	0.04987	0.03827	0.02940	0.02262
57	0.08135	0.06197	0.04727	0.03610	0.02761	0.02114
58	0.07785	0.05902	0.04481	0.03406	0.02592	0.01976
59	0.07450	0.05621	0.04247	0.03213	0.02434	0.01846
60	0.07129	0.05353	0.04026	0.03031	0.02286	0.01726
61	0.06822	0.05099	0.03816	0.02860	0.02146	0.01613
62	0.06528	0.04856	0.03617	0.02698	0.02015	0.01507
63	0.06247	0.04625	0.03428	0.02545	0.01892	0.01409
64	0.05978	0.04404	0.03250	0.02401	0.01777	0.01316
65	0.05721	0.04195	0.03080	0.02265	0.01668	0.01230
66	0.05474	0.03995	0.02920	0.02137	0.01566	0.01150
67	0.05238	0.03805	0.02767	0.02016	0.01471	0.01075
68	0.05013	0.03623	0.02623	0.01902	0.01381	0.01004
69	0.04797	0.03451	0.02486	0.01794	0.01297	0.00939
70	0.04590	0.03287	0.02357	0.01693	0.01218	0.00877
71	0.04393	0.03130	0.02234	0.01597	0.01143	0.00820
72	0.04204	0.02981	0.02117	0.01506	0.01074	0.00766
73	0.04023	0.02839	0.02007	0.01421	0.01008	0.00716

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PRESENT VALUE OF 1 AT COMPOUND INTEREST

(Continued)

$$v^n = (1 + i)^{-n}$$

n	4½%	5%	5½%	6%	6½%	7%
74	0.03849	0.02704	0.01902	0.01341	0.00946	0.00669
75	0.03684	0.02575	0.01803	0.01265	0.00889	0.00625
76	0.03525	0.02452	0.01709	0.01193	0.00834	0.00585
77	0.03373	0.02336	0.01620	0.01126	0.00784	0.00546
78	0.03228	0.02224	0.01536	0.01062	0.00736	0.00511
79	0.03089	0.02119	0.01456	0.01002	0.00691	0.00477
80	0.02956	0.02018	0.01380	0.00945	0.00649	0.00446
81	0.02829	0.01922	0.01308	0.00892	0.00609	0.00417
82	0.02707	0.01830	0.01240	0.00841	0.00572	0.00389
83	0.02590	0.01743	0.01175	0.00794	0.00537	0.00364
84	0.02479	0.01660	0.01114	0.00749	0.00504	0.00340
85	0.02372	0.01581	0.01056	0.00706	0.00473	0.00318
86	0.02270	0.01506	0.01001	0.00666	0.00445	0.00297
87	0.02172	0.01434	0.00948	0.00629	0.00417	0.00278
88	0.02079	0.01366	0.00899	0.00593	0.00392	0.00259
89	0.01989	0.01301	0.00852	0.00559	0.00368	0.00243
90	0.01903	0.01239	0.00808	0.00528	0.00346	0.00227
91	0.01821	0.01180	0.00766	0.00498	0.00324	0.00212
92	0.01743	0.01123	0.00726	0.00470	0.00305	0.00198
93	0.01668	0.01070	0.00688	0.00443	0.00286	0.00185
94	0.01596	0.01019	0.00652	0.00418	0.00269	0.00173
95	0.01527	0.00970	0.00618	0.00394	0.00252	0.00162
96	0.01462	0.00924	0.00586	0.00372	0.00237	0.00151
97	0.01399	0.00880	0.00555	0.00351	0.00222	0.00141
98	0.01338	0.00838	0.00526	0.00331	0.00209	0.00132
99	0.01281	0.00798	0.00499	0.00312	0.00196	0.00123
100	0.01226	0.00760	0.00473	0.00295	0.00184	0.00115

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PRESENT VALUE OF 1 PER ANNUM AT COMPOUND INTEREST *(Continued)*

$a^n = (1 - v^n) / i$

n	4½%	5%	5½%	6%	6½%	7%
1	0.95694	0.95238	0.94787	0.94340	0.93897	0.93458
2	1.87267	1.85941	1.84632	1.83339	1.82063	1.80802
3	2.74896	2.72325	2.69793	2.67301	2.64847	2.62432
4	3.58753	3.54595	3.50515	3.46511	3.42580	3.38721
5	4.38998	4.32948	4.27028	4.21236	4.15568	4.10020
6	5.15787	5.07569	4.99553	4.91732	4.84101	4.76654
7	5.89270	5.78637	5.68297	5.58238	5.48452	5.38929
8	6.59589	6.46321	6.33457	6.20979	6.08875	5.97130
9	7.26879	7.10782	6.95219	6.80169	6.65610	6.51523
10	7.91272	7.72173	7.53763	7.36009	7.18883	7.02358
11	8.52892	8.30641	8.09254	7.88687	7.68904	7.49867
12	9.11858	8.86325	8.61852	8.38384	8.15872	7.94269
13	9.68285	9.39357	9.11708	8.85268	8.59974	8.35765
14	10.22282	9.89864	9.58965	9.29498	9.01384	8.74547
15	10.73955	10.37966	10.03758	9.71225	9.40267	9.10791
16	11.23401	10.83777	10.46216	10.10589	9.76776	9.44665
17	11.70719	11.27407	10.86461	10.47726	10.11058	9.76322
18	12.15999	11.68959	11.24607	10.82760	10.43247	10.05909
19	12.59329	12.08532	11.60765	11.15812	10.73471	10.33559
20	13.00794	12.46221	11.95038	11.46992	11.01851	10.59401
21	13.40472	12.82115	12.27524	11.76408	11.28498	10.83553
22	13.78442	13.16300	12.58317	12.04158	11.53520	11.06124
23	14.14777	13.48857	12.87504	12.30338	11.77014	11.27219
24	14.49548	13.79864	13.15170	12.55036	11.99074	11.46933
25	14.82821	14.09394	13.41393	12.78336	12.19788	11.65358
26	15.14661	14.37518	13.66249	13.00317	12.39237	11.82578
27	15.45130	14.64303	13.89810	13.21053	12.57500	11.98671
28	15.74287	14.89813	14.12142	13.40616	12.74648	12.13711
29	16.02189	15.14107	14.33310	13.59072	12.90749	12.27767
30	16.28889	15.37245	14.53374	13.76483	13.05868	12.40904
31	16.54439	15.59281	14.72393	13.92909	13.20063	12.53181
32	16.78889	15.80268	14.90420	14.08404	13.33393	12.64655
33	17.02286	16.00255	15.07507	14.23023	13.45909	12.75379
34	17.24676	16.19290	15.23703	14.36814	13.57661	12.85401
35	17.46101	16.37419	15.39055	14.49825	13.68696	12.94767
36	17.66604	16.54685	15.53607	14.62099	13.79057	13.03521

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PRESENT VALUE OF 1 PER ANNUM AT COMPOUND INTEREST (*Continued*)

$$a^n = (1 - v^n) / i$$

n	4½%	5%	5½%	6%	6½%	7%
37	17.86224	16.71129	15.67400	14.73678	13.88786	13.11702
38	18.04999	16.86789	15.80474	14.84602	13.97921	13.19347
39	18.22966	17.01704	15.92866	14.94907	14.06499	13.26493
40	18.40158	17.15909	16.04612	15.04630	14.14553	13.33171
41	18.56611	17.29437	16.15746	15.13802	14.22115	13.39412
42	18.72355	17.42321	16.26300	15.22454	14.29216	13.45245
43	18.87421	17.54591	16.36303	15.30617	14.35884	13.50696
44	19.01838	17.66277	16.45785	15.38318	14.42144	13.55791
45	19.15635	17.77407	16.54773	15.45583	14.48023	13.60552
46	19.28837	17.88007	16.63291	15.52437	14.53543	13.65002
47	19.41471	17.98102	16.71366	15.58903	14.58725	13.69151
48	19.53561	18.07716	16.79020	15.65003	14.63592	13.73047
49	19.65130	18.16872	16.86275	15.70757	14.68161	13.76680
50	19.76201	18.25592	16.93152	15.76186	14.72452	13.80075
51	19.86795	18.33898	16.99670	15.81308	14.76481	13.83247
52	19.96933	18.41807	17.05848	15.86139	14.80264	13.86212
53	20.06634	18.49340	17.11704	15.90697	14.83816	13.88984
54	20.15918	18.56515	17.17255	15.94997	14.87151	13.91573
55	20.24802	18.63347	17.22517	15.99054	14.90282	13.93994
56	20.33303	18.69854	17.27504	16.02881	14.93223	13.96256
57	20.41439	18.76052	17.32232	16.06492	14.95984	13.98370
58	20.49224	18.81954	17.36712	16.09898	14.98577	14.00346
59	20.56673	18.87575	17.40960	16.13111	15.01011	14.02192
60	20.63802	18.92929	17.44985	16.16143	15.03297	14.03918
61	20.70624	18.98028	17.48801	16.19003	15.05443	14.05531
62	20.77152	19.02883	17.52418	16.21701	15.07458	14.07038
63	20.83399	19.07508	17.55847	16.24246	15.09350	14.08447
64	20.89377	19.11912	17.59096	16.26647	15.11127	14.09763
65	20.95098	19.16107	17.62177	16.28912	15.12795	14.10994
66	21.00572	19.20102	17.65096	16.31049	15.14362	14.12144
67	21.05811	19.23907	17.67864	16.33065	15.15833	14.13219
68	21.10824	19.27530	17.70487	16.34967	15.17214	14.14223
69	21.15621	19.30981	17.72974	16.36762	15.18511	14.15162
70	21.20211	19.34268	17.75330	16.38454	15.19728	14.16039
71	21.24604	19.37398	17.77564	16.40051	15.20872	14.16859
72	21.28808	19.40379	17.79682	16.41558	15.21945	14.17625

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PRESENT VALUE OF 1 PER ANNUM AT COMPOUND INTEREST (*Continued*)

$a_{\overline{n}|} = (1 - v^n)/i$

n	4½%	5%	5½%	6%	6½%	7%
73	21.32830	19.43218	17.81689	16.42979	15.22953	14.18341
74	21.36680	19.45922	17.83591	16.44320	15.23900	14.19010
75	21.40363	19.48497	17.85395	16.45585	15.24788	14.19636
76	21.43888	19.50949	17.87104	16.46778	15.25623	14.20220
77	21.47262	19.53285	17.88724	16.47904	15.26406	14.20767
78	21.50490	19.55510	17.90260	16.48966	15.27142	14.21277
79	21.53578	19.57628	17.91715	16.49968	15.27833	14.21755
80	21.56534	19.59646	17.93095	16.50913	15.28482	14.22200
81	21.59363	19.61568	17.94403	16.51805	15.29091	14.22617
82	21.62070	19.63398	17.95643	16.52646	15.29663	14.23007
83	21.64660	19.65141	17.96818	16.53440	15.30200	14.23371
84	21.67139	19.66801	17.97931	16.54188	15.30704	14.23711
85	21.69511	19.68382	17.98987	16.54895	15.31177	14.24029
86	21.71781	19.69887	17.99988	16.55561	15.31622	14.24326
87	21.73953	19.71321	18.00936	16.56190	15.30239	14.24604
88	21.76032	19.72687	18.01835	16.56783	15.32431	14.24863
89	21.78021	19.73987	18.02688	16.57342	15.32799	14.25106
90	21.79924	19.75226	18.03495	16.57870	15.33145	14.25333
91	21.81745	19.76406	18.04261	16.58368	15.33470	14.25545
92	21.83488	19.77529	18.04987	16.58838	15.33774	14.25743
93	21.85156	19.78599	18.05675	16.59281	15.34060	14.25928
94	21.86753	19.79618	18.06327	16.59699	15.34329	14.26101
95	21.88280	19.80589	18.06945	16.60093	15.34581	14.26262
96	21.89742	19.81513	18.07530	16.60465	15.34818	14.26413
97	21.91140	19.82394	18.08086	16.60816	15.35040	14.26555
98	21.92479	19.83232	18.08612	16.61147	15.35249	14.26686
99	21.93760	19.84031	18.09111	16.61460	15.35445	14.26810
100	21.94985	19.84791	18.09584	16.61755	15.35629	14.26925

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PRESENT VALUE OF AN AMOUNT AT COMPOUND INTEREST

Months	4%	5%	5½%	6%	6½%	7%
1	.9967	.9958	.9954	.9950	.9946	.9942
2	.9934	.9917	.9909	.9901	.9893	.9844
3	.9901	.9876	.9864	.9851	.9839	.9827
4	.9868	.9835	.9819	.9802	.9786	.9770
5	.9835	.9794	.9774	.9754	.9733	.9713
6	.9802	.9754	.9729	.9705	.9681	.9657
7	.9770	.9713	.9685	.9657	.9629	.9601
8	.9737	.9673	.9641	.9609	.9577	.9545
9	.9705	.9633	.9597	.9561	.9505	.9490
10	.9673	.9593	.9553	.9513	.9454	.9435
11	.9641	.9553	.9510	.9466	.9403	.9380
12	.9609	.9513	.9466	.9419	.9352	.9326
Quarters	4%	5%	5½%	6%	6½%	7%
1	.9901	.9877	.9864	.9852	.9840	.9828
2	.9803	.9755	.9731	.9707	.9683	.9659
3	.9706	.9634	.9599	.9563	.9528	.9493
4	.9610	.9515	.9468	.9422	.9376	.9330

PRESENT VALUE OF INSTALLMENT SERIES AT COMPOUND INTEREST

Months	4%	5%	5½%	6%	6½%	7%
1	.9967	.9958	.9954	.9950	.9946	.9942
2	1.9900	1.9876	1.9863	1.9851	1.9839	1.9826
3	2.9801	2.9752	2.9727	2.9702	2.9678	2.9653
4	3.9669	3.9587	3.9546	3.9505	3.9464	3.9423
5	4.9504	4.9381	4.9320	4.9259	4.9197	4.9137
6	5.9306	5.9135	5.9049	5.8964	5.8878	5.8794
7	6.9076	6.8848	6.8734	6.8621	6.8507	6.8395
8	7.8813	7.8521	7.8375	7.8230	7.8084	7.7940
9	8.8518	8.8153	8.7972	8.7791	8.7589	8.7430
10	9.9191	9.7746	9.7525	9.7304	9.7043	9.6865
11	10.7831	10.7299	10.7035	10.6770	10.6446	10.6245
12	11.7440	11.6812	11.6501	11.6189	11.5798	11.5571
Quarters	4%	5%	5½%	6%	6½%	7%
1	.9901	.9877	.9864	.9852	.9840	.9828
2	.9704	1.9631	1.9595	1.9559	1.9523	1.9487
3	2.9410	2.9265	2.9194	2.9122	2.9051	2.8980
4	3.9020	3.8781	3.8662	3.8544	3.8427	3.8309

FRACTIONAL MONTHLY RENTS

TABLE FOR COMPUTING RENTS FOR FRACTIONAL PARTS OF ANY MONTH BY DAYS

Days	*Month of 31 days*	*Month of 30 days*	*Month of 29 days*	*Month of 28 days*
1	.032258	.033333	.034483	.035714
2	.064516	.066666	.068966	.071428
3	.096774	.100000	.103449	.107142
4	.129032	.133333	.137931	.142856
5	.161290	.166666	.172414	.178570
6	.193548	.200000	.206897	.214284
7	.225806	.233333	.241380	.250000
8	.258064	.266666	.275863	.285714
9	.290322	.300000	.310346	.321428
10	.322580	.333333	.344828	.357142
11	.354838	.366666	.379311	.392856
12	.387096	.400000	.413793	.428570
13	.419354	.433333	.448276	.464284
14	.451612	.466666	.482759	.500000
15	.483870	.500000	.517242	.535714
16	.516128	.533333	.551724	.571428
17	.548386	.566666	.586207	.607142
18	.580644	.600000	.620690	.642856
19	.612903	.633333	.655173	.678570
20	.645161	.666666	.689655	.714284
21	.677419	.700000	.724138	.750000
22	.709677	.733333	.758621	.785714
23	.741935	.766666	.793104	.821428
24	.774193	.800000	.827586	.857142
25	.806451	.833333	.862069	.892856
26	.838709	.866666	.896552	.928570
27	.870968	.900000	.931034	.964284
28	.903226	.933333	.965517	1.000000
29	.935484	.966666	1.000000	....
30	.967742	1.000000	....	....
31	1.000000	....	....	....

$$\frac{\textbf{COEF. } d}{\textbf{100 ft.} = \textbf{100\%}}$$

DEPTH COEFFICIENTS

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 100 feet deep.

Depth in Feet	*High-Class Retail Dis.* 65% *to* 90%	*Ordinary Retail* 62½% *to* 85%	*Wholesale District* 55% *to* 80%	*Apartmt. District* 52% *to* 58%	*House District* 52½% *to* 65%	*Depth in Feet*
1	.07987	.06026	.02787	.01441	.01711	1
2	.12284	.09641	.05066	.02769	.03258	2
3	.15775	.12677	.07170	.04059	.04742	3
4	.18826	.15371	.09168	.05319	.06190	4
5	.21573	.17836	.11079	.06492	.07604	5
6	.24089	.20137	.12918	.07788	.08988	6
7	.26438	.22295	.14702	.08999	.10354	7
8	.28634	.24331	.16443	.10172	.11705	8
9	.30711	.26271	.18137	.11378	.13035	9
10	.32684	.28133	.19784	.12559	.14346	10
11	.34561	.29923	.21392	.13731	.15640	11
12	.36358	.31652	.22967	.14892	.16919	12
13	.38083	.33315	.24507	.16044	.18186	13
14	.39752	.34918	.26021	.17187	.19444	14
15	.41358	.36467	.27509	.18323	.20691	15
16	.42899	.37973	.28974	.19442	.21928	16
17	.44393	.39437	.30412	.20563	.23151	17
18	.45839	.40859	.31819	.21682	.24363	18
19	.47244	.42245	.33201	.22796	.25563	19
20	.48602	.43600	.34558	.23904	.26753	20
21	.49920	.44920	.35890	.25007	.27931	21
22	.51198	.46210	.37203	.26105	.29098	22
23	.52444	.47475	.38496	.27200	.30252	23
24	.53666	.48717	.39769	.28281	.31396	24
25	.54848	.49922	.41023	.29359	.32538	25
26	.56006	.51097	.42255	.30433	.33676	26
27	.57141	.52248	.43470	.31500	.34803	27
28	.58242	.53368	.44671	.32562	.35923	28
29	.59321	.54471	.45855	.33619	.37034	29
30	.60375	.55550	.47023	.34670	.38138	30
31	.61397	.56604	.48176	.35712	.39236	31
32	.62396	.57646	.49319	.36750	.40327	32
33	.63378	.58664	.50442	.37791	.41405	33
34	.64337	.59665	.51545	.38829	.42476	34

Value of an inside lot given by the formula:

$V = (F\ \text{equiv.})\ (B)\ (\text{Coef. } d)$

COEF. d
100 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 100 feet deep.

Depth in Feet	*High-Class Retail Dis. 65% to 90%*	*Ordinary Retail 62½% to 85%*	*Wholesale District 55% to 80%*	*Apartmt. District 52% to 58%*	*House District 52½% to 65%*	*Depth in Feet*
35	.65272	.60647	.52632	.39864	.43541	35
36	.66190	.61605	.53705	.40895	.44599	36
37	.67092	.62551	.54761	.41923	.45649	37
38	.67979	.63479	.55800	.42948	.46690	38
39	.68841	.64395	.56826	.43968	.47722	39
40	.69680	.65293	.57838	.44984	.48752	40
41	.70503	.66178	.58835	.45998	.49770	41
42	.71317	.67046	.59818	.47007	.50782	42
43	.72109	.67902	.60788	.48014	.51788	43
44	.72883	.68739	.61747	.49017	.52784	44
45	.73642	.69565	.62694	.50017	.53771	45
46	.74384	.70384	.63630	.51014	.54735	46
47	.75127	.71192	.64553	.52001	.55727	47
48	.75854	.71987	.65464	.52982	.56696	48
49	.76557	.72765	.66364	.53962	.57662	49
50	.77252	.73524	.67250	.54940	.58626	50
51	.77931	.74271	.68125	.55914	.59585	51
52	.78602	.74806	.68989	.56886	.60541	52
53	.79265	.75729	.69841	.57852	.61486	53
54	.79920	.76440	.70683	.58814	.62426	54
55	.80551	.77139	.71516	.59772	.63362	55
56	.81174	.77826	.72341	.60728	.64290	56
57	.81789	.78507	.73155	.61681	.65213	57
58	.82388	.79176	.73960	.62630	.66131	58
59	.82979	.79832	.74754	.63574	.67044	59
60	.83570	.80477	.75537	.64514	.67952	60
61	.84129	.81110	.76312	.65450	.68854	61
62	.84688	.81737	.77081	.66379	.69752	62
63	.85231	.82357	.77842	.67306	.70644	63
64	.85766	.82972	.78597	.68233	.71532	64
65	.86293	.83574	.79338	.69160	.72407	65
66	.86821	.84165	.80065	.70086	.73282	66
67	.87332	.84749	.80784	.71010	.74151	67
68	.87835	.85323	.81495	.71933	.75011	68

Value of an inside lot given by the formula:
V = (F equiv.) (B) (Coef. d)

COEF. d
100 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 100 feet deep.

Depth in Feet	*High-Class Retail Dis. 65% to 90%*	*Ordinary Retail 62½% to 85%*	*Wholesale District 55% to 80%*	*Apartmt. District 52% to 58%*	*House District 52½% to 65%*	*Depth in Feet*
69	.88322	.85894	.82194	.72853	.75869	69
70	.88801	.86455	.82885	.73768	.76722	70
71	.89281	.87003	.83568	.74681	.77565	71
72	.89752	.87539	.84242	.75588	.78414	72
73	.90207	.88069	.84908	.76501	.79254	73
74	.90662	.88600	.85563	.77406	.80085	74
75	.91110	.89118	.86209	.78309	.80910	75
76	.91549	.89630	.86848	.79211	.81731	76
77	.91980	.90136	.87477	.80107	.82546	77
78	.92404	.90636	.88102	.81004	.83358	78
79	.92811	.91124	.88717	.81895	.84167	79
80	.93218	.91606	.89325	.82785	.84969	80
81	.93610	.92088	.89924	.83673	.85766	81
82	.94001	.92558	.90515	.84557	.86557	82
83	.94392	.93022	.91100	.85438	.87344	83
84	.94776	.93474	.91676	.86316	.88126	84
85	.95151	.93926	.92245	.87193	.88903	95
86	.95511	.94372	.92805	.88067	.89675	86
87	.95862	.94812	.93360	.88939	.90441	87
88	.96214	.95233	.93911	.89807	.91204	88
89	.96557	.95662	.94455	.90677	.91961	89
90	.96901	.96083	.94990	.91542	.92708	90
91	.97228	.96499	.95522	.92404	.93450	91
92	.97556	.96915	.96046	.93262	.94199	92
93	.97883	.97325	.96564	.94117	.94932	93
94	.98203	.97722	.97071	.94964	.95667	94
95	.98522	.98120	.97576	.95807	.96396	95
96	.98834	.98512	.98075	.96648	.97122	96
97	.99129	.98897	.98565	.97489	.97845	97
98	.99425	.99271	.99050	.98328	.98567	98
99	.99712	.99638	.99529	.99094	.99285	99
100	1.00000	1.00000	1.00000	1.00000	1.00000	100
101	1.00279	1.00356	1.00465	1.00833	1.00714	101

Value of an inside lot given by the formula:
V = (F equiv.) (B) (Coef. d)

COEF. d

100 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 100 feet deep.

Depth in Feet	*High-Class Retail Dis.* 65% *to* 90%	*Ordinary Retail* 62½% to 85%	*Wholesale District* 55% *to* 80%	*Apartmt. District* 52% *to* 58%	*House District* 52½% *to* 65%	*Depth in Feet*
102	1.00559	1.00705	1.00925	1.01662	1.01422	102
103	1.00831	1.01048	1.01379	1.02490	1.02126	103
104	1.01094	1.01392	1.01828	1.03318	1.02815	104
105	1.01357	1.01729	1.02271	1.04154	1.03525	105
106	1.01621	1.02061	1.02708	1.04958	1.04214	106
107	1.01876	1.02386	1.03138	1.05772	1.04899	107
108	1.02132	1.02705	1.03564	1.06586	1.05583	108
109	1.02372	1.03019	1.03985	1.07398	1.06263	109
110	1.02612	1.03332	1.04403	1.08205	1.06939	110
111	1.02843	1.03639	1.04815	1.09010	1.07609	111
112	1.03075	1.03941	1.05222	1.09813	1.08277	112
113	1.03307	1.04242	1.05626	1.10617	1.08942	112
114	1.03530	1.04537	1.06024	1.11420	1.09602	114
115	1.03745	1.04826	1.06417	1.12217	1.10252	115
116	1.03962	1.05110	1.06802	1.13011	1.10910	116
117	1.04169	1.05393	1.07186	1.13801	1.11559	117
118	1.04377	1.05670	1.07560	1.14591	1.12208	118
119	1.04577	1.05941	1.07930	1.15377	1.12850	119
120	1.04776	1.06206	1.08298	1.16159	1.13488	120
121	1.04968	1.06465	1.08661	1.16936	1.14122	121
122	1.05160	1.06718	1.09017	1.17713	1.14757	122
123	1.05343	1.06978	1.09374	1.18487	1.15386	123
124	1.05527	1.07231	1.09725	1.19259	1.16011	124
125	1.05703	1.07478	1.10070	1.20027	1.16634	125
126	1.05878	1.07725	1.10413	1.20795	1.17253	126
127	1.06046	1.07972	1.10753	1.21561	1.17866	127
128	1.06214	1.08213	1.11090	1.22326	1.18474	128
129	1.06373	1.08449	1.11419	1.23091	1.19084	129
130	1.06533	1.08677	1.11742	1.23855	1.19684	130
131	1.06693	1.08906	1.12060	1.24620	1.20282	131
132	1.06853	1.09129	1.12372	1.25378	1.20879	132
133	1.07005	1.09352	1.12681	1.26138	1.21641	133
134	1.07157	1.09569	1.12985	1.26896	1.22056	134

Value of an inside lot given by the formula:

$V = (F \text{ equiv.})\ (B)\ (\text{Coef. } d)$

COEF. d
100 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 100 feet deep.

Depth in Feet	*High-Class Retail Dis.* 65% to 90%	*Ordinary Retail* 62½% to 85%	*Wholesale District* 55% to 80%	*Apartmt. District* 52% to 58%	*House District* 52½% to 65%	*Depth in Feet*
135	1.07300	1.09785	1.13286	1.27652	1.22639	135
136	1.07444	1.09996	1.13582	1.28406	1.23221	136
137	1.07580	1.10201	1.13871	1.29159	1.23799	137
138	1.07708	1.10406	1.14158	1.29909	1.24375	138
139	1.07835	1.10605	1.14443	1.30658	1.24947	139
140	1.07963	1.10804	1.14721	1.31402	1.25518	140
141	1.08091	1.10997	1.14997	1.32145	1.26084	141
142	1.08219	1.11183	1.15267	1.32886	1.26645	142
143	1.08339	1.11370	1.15535	1.33626	1.27204	143
144	1.08458	1.11551	1.15797	1.34363	1.27761	144
145	1.08570	1.11714	1.16056	1.35099	1.28315	145
146	1.08682	1.11906	1.16312	1.35833	1.28867	146
147	1.08794	1.12081	1.16563	1.36566	1.29584	147
148	1.08906	1.12256	1.16808	1.37294	1.29955	148
149	1.09010	1.12425	1.17054	1.38021	1.30493	149
150	1.09113	1.12593	1.17293	1.38748	1.31028	150
151	1.09217	1.12756	1.17527	1.39474	1.31560	151
152	1.09321	1.12919	1.17759	1.40198	1.32090	152
153	1.09417	1.13069	1.17987	1.40916	1.32617	153
154	1.09505	1.13238	1.18213	1.41633	1.33140	154
155	1.09593	1.13395	1.18436	1.42350	1.33661	155
156	1.09681	1.13545	1.18656	1.43067	1.34179	156
157	1.09760	1.13690	1.18873	1.43778	1.34695	157
158	1.09832	1.13835	1.19085	1.44488	1.35208	158
159	1.09912	1.13979	1.19294	1.45211	1.35716	159
160	1.09993	1.14118	1.19497	1.45903	1.36222	160
161	1.10064	1.14256	1.19698	1.46608	1.36725	161
162	1.10128	1.14389	1.19899	1.47312	1.37226	162
163	1.10200	1.14528	1.20094	1.48014	1.37723	163
164	1.10264	1.14660	1.20286	1.48710	1.38217	164
165	1.10335	1.14787	1.20475	1.49409	1.38706	165
166	1.10399	1.14913	1.20662	1.50102	1.39193	166
167	1.10463	1.15034	1.20846	1.50793	1.39679	167

Value of an inside lot given by the formula:
V = (F equiv.) (B) (Coef. d)

COEF. d

100 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 100 feet deep.

Depth in Feet	*High-Class Retail Dis. 65% to 90%*	*Ordinary Retail 62½% to 85%*	*Wholesale District 55% to 80%*	*Apartmt. District 52% to 58%*	*House District 52½% to 65%*	*Depth in Feet*
168	1.10527	1.15154	1.21024	1.51484	1.40161	168
169	1.10583	1.15275	1.21200	1.52175	1.40641	169
170	1.10639	1.15389	1.21375	1.52864	1.41118	170
171	1.10687	1.15504	1.21545	1.53549	1.41592	171
172	1.10735	1.15618	1.21713	1.54233	1.42060	172
173	1.10783	1.15727	1.21849	1.54915	1.42528	173
174	1.10823	1.15835	1.22039	1.55597	1.42990	174
175	1.10870	1.15938	1.22200	1.56276	1.43454	175
176	1.10911	1.16040	1.22360	1.56952	1.43910	176
177	1.10951	1.16136	1.22515	1.57629	1.44366	177
178	1.10982	1.16233	1.22668	1.58305	1.44821	178
179	1.11022	1.16335	1.22819	1.58978	1.45271	179
180	1.11062	1.16432	1.22964	1.59649	1.45765	180
181	1.11094	1.16522	1.23109	1.60318	1.46153	181
182	1.11118	1.16612	1.23253	1.60984	1.46592	182
183	1.11150	1.16709	1.23396	1.61648	1.47032	183
184	1.11174	1.16799	1.23532	1.62309	1.47473	184
185	1.11206	1.16890	1.23666	1.62968	1.47905	185
186	1.11230	1.16974	1.23797	1.63626	1.48331	186
187	1.11254	1.17058	1.23925	1.64277	1.48759	187
188	1.11278	1.17137	1.24053	1.64926	1.49182	188
189	1.11302	1.17221	1.24179	1.65574	1.49606	189
190	1.11326	1.17299	1.24301	1.66217	1.50032	190
191	1.11350	1.17378	1.24421	1.66860	1.50451	191
192	1.11366	1.17450	1.24538	1.67501	1.50869	192
193	1.11374	1.17522	1.24652	1.68144	1.51289	193
194	1.11382	1.17595	1.24767	1.68784	1.51699	194
195	1.11390	1.17661	1.24875	1.69424	1.52111	195
196	1.11398	1.17727	1.24984	1.70060	1.52521	196
197	1.11406	1.17787	1.25090	1.70696	1.52930	187
198	1.11414	1.17848	1.25193	1.71331	1.53337	198
199	1.11418	1.17908	1.25290	1.71964	1.53738	199
200	1.11422	1.17962	1.25391	1.72595	1.54144	200

Value of an inside lot given by the formula:
V = (F equiv.) (B) (Coef. d)

COEF. d

125 ft. = 100%

DEPTH COEFFICIENTS

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 125 feet deep.

Depth in Feet	*High-Class Retail Dis.* 65% *to* 90%	*Ordinary Retail* 62½% *to* 85%	*Wholesale District* 55% *to* 80%	*Apartmt. District* 52% *to* 58%	*House District* 52½% *to* 65%	*Depth in Feet*
1	.07556	.05606	.02532	.01200	.01146	1
2	.11622	.08970	.04602	.02307	.02793	2
3	.14924	.11796	.06514	.03382	.04066	3
4	.17810	.14302	.08329	.04431	.05307	4
5	.20410	.16595	.10068	.05345	.06519	5
6	.22790	.18736	.11738	.06488	.07707	6
7	.25011	.20743	.13359	.07407	.08878	7
8	.27089	.22638	.14941	.08513	.10036	8
9	.29054	.24443	.16480	.09480	.11176	9
10	.30920	.26176	.17974	.10463	.12300	10
11	.32696	.27841	.19437	.11440	.13410	11
12	.34396	.29450	.20867	.12407	.14506	12
13	.36028	.30997	.22267	.13367	.15592	13
14	.37608	.32489	.23642	.14319	.16671	14
15	.39126	.33929	.24999	.15262	.17740	15
16	.40585	.35331	.26325	.16198	.18801	16
17	.41998	.36693	.27632	.17132	.19849	17
18	.43366	.38016	.28910	.18064	.20888	18
19	.44695	.39306	.30166	.18992	.21917	19
20	.45980	.40567	.31399	.19116	.22938	20
21	.47227	.41795	.32609	.20835	.23947	21
22	.48436	.42995	.33807	.21750	.24949	22
23	.49615	.44172	.34976	.22661	.25938	23
24	.50771	.45327	.36133	.23562	.26919	24
25	.51889	.46448	.37270	.24460	.27898	25
26	.52985	.47542	.38391	.25355	.28874	26
27	.54058	.48612	.39495	.26244	.29840	27
28	.55100	.49658	.40586	.27129	.30800	28
29	.56121	.50683	.41662	.28009	.31753	29
30	.57118	.51687	.42722	.28885	.32700	30
31	.58085	.52668	.43745	.29753	.33641	31
32	.59030	.53638	.44808	.30618	.34576	32
33	.59959	.54583	.45824	.31485	.35501	33
34	.60866	.55514	.46831	.32350	.36418	34

Value of an inside lot given by the formula:
V = (F equiv.) (B) (Coef. d)

COEF. d
125 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 125 feet deep.

Depth in Feet	*High-Class Retail Dis.* 65% to 90%	*Ordinary Retail* 62½% to 85%	*Wholesale District* 55% to 80%	*Apartmt. District* 52% to 58%	*House District* 52½% to 65%	*Depth in Feet*
35	.61750	.56430	.47818	.33212	.37331	35
36	.62619	.57321	.48793	.34071	.38239	36
37	.63473	.58202	.49753	.34928	.39139	37
38	.64312	.59064	.50697	.35782	.39885	38
39	.65128	.59920	.51626	.36632	.40917	39
40	.65921	.60737	.52548	.37479	.41798	40
41	.66699	.61577	.53454	.38323	.42673	41
42	.67470	.62384	.54348	.39164	.43541	42
43	.68218	.63180	.55228	.40002	.44402	43
44	.68951	.63959	.56099	.40838	.45257	44
45	.69669	.64728	.56960	.41672	.46103	45
46	.70372	.65491	.57810	.42502	.46946	46
47	.71075	.66241	.58649	.43325	.47780	47
48	.71762	.66981	.59476	.44142	.48611	48
49	.72427	.67704	.60293	.44958	.49437	49
50	.73084	.68420	.61097	.45773	.50266	50
51	.73727	.69104	.61894	.46585	.51088	51
52	.74361	.69770	.62679	.47394	.51907	52
53	.74989	.70463	.63454	.48199	.52718	53
54	.75608	.71124	.63965	.49000	.53524	54
55	.76205	.71774	.64975	.49799	.54326	55
56	.76795	.72413	.65724	.50596	.55122	56
57	.77376	.73046	.66464	.51390	.55913	57
58	.77943	.73672	.67195	.52180	.56700	58
59	.78502	.74280	.67917	.52967	.57483	59
60	.79054	.74878	.68628	.53750	.58261	60
61	.79590	.75471	.69332	.54530	.59035	61
62	.80119	.76052	.70031	.55303	.59805	62
63	.80633	.76631	.70722	.56076	.60570	63
64	.81139	.77202	.71408	.56848	.61331	64
65	.81638	.77762	.72081	.57621	.62081	65
66	.82137	.78301	.72742	.58392	.62831	66
67	.82621	.78853	.73395	.59162	.63576	67
68	.83097	.79391	.74041	.59931	.64314	68

Value of an inside lot given by the formula:
V = (F equiv.) (B) (Coef. d)

COEF. d

125 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 125 feet deep.

Depth in Feet	*High-Class Retail Dis. 65% to 90%*	*Ordinary Retail 62½% to 85%*	*Wholesale District 55% to 80%*	*Apartmt. District 52% to 58%*	*House District 52½% to 65%*	*Depth in Feet*
69	.83558	.79923	.74676	.60697	.65049	69
70	.84011	.80445	.75304	.61460	.65781	70
71	.84464	.80955	.75924	.62220	.66508	71
72	.84910	.81454	.76537	.62980	.67232	72
73	.85341	.81947	.77142	.63736	.67952	73
74	.85771	.82440	.77737	.64491	.68664	74
75	.86195	.82923	.78322	.65243	.69374	75
76	.86610	.83399	.78904	.65995	.70076	76
77	.87018	.83870	.79476	.66741	.70775	77
78	.87419	.84335	.80043	.67488	.71471	78
79	.87804	.84790	.80603	.68231	.72164	79
80	.88190	.85238	.81154	.68972	.72852	80
81	.88560	.85687	.81699	.69712	.73535	81
82	.88930	.86124	.82235	.70448	.74213	82
83	.89300	.86556	.82767	.71182	.74888	83
84	.89663	.86976	.83291	.71914	.75559	84
85	.90018	.87394	.83808	.72644	.76226	85
86	.90358	.87811	.84316	.73372	.76887	86
87	.90691	.88221	.84820	.74099	.77544	87
88	91023	.88619	.85321	.74824	.78197	88
89	.91348	.89011	.85815	.75547	.78847	89
90	.91673	.89404	.86301	.76268	.79487	90
91	.91983	.89710	.86785	.76986	.80124	91
92	.92293	.90177	.87261	.77701	.80766	92
93	.92602	.90347	.87729	.78414	.81394	93
94	.92905	.90928	.88192	.79119	.82025	94
95	.93207	.91299	.88650	.79822	.82649	95
96	.93502	.91663	.89104	.80522	.83272	96
97	.93781	.92022	.89549	.81223	.83892	97
98	.94061	.92369	.89990	.81922	.84511	98
99	.94333	.92711	.90425	.82620	.85126	99
100	.94605	.93043	.90851	.83316	.85740	100
101	.94869	.93378	.91276	.84009	.86352	101

Value of an inside lot given by the formula:
V = (F equiv.) (B) (Coef. d)

COEF. d

125 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 125 feet deep.

Depth in Feet	*High-Class Retail Dis.* 65% to 90%	*Ordinary Retail* 62½% to 85%	*Wholesale District* 55% to 80%	*Apartmt. District* 52% to 58%	*House District* 52½% to 65%	*Depth in Feet*
102	.95134	.93704	.91693	.84700	.86958	102
103	.95391	.94023	.92106	.85389	.87562	103
104	.95640	.94343	.92514	.86079	.88165	104
105	.95889	.94652	.92916	.86776	.88761	105
106	.96139	.94965	.93314	.87445	.89352	106
107	.96382	.95268	.93703	.88124	.89940	107
108	.96622	.95365	.94091	.88802	.90526	108
109	.96849	.95856	.94473	.89478	.91110	109
110	.97076	.96148	.94853	.90151	.91689	110
111	.97300	.96434	.95227	.90822	.92263	111
112	.97515	.96714	.95597	.91491	.92836	112
113	.97735	.96994	.95964	.92160	.93406	113
114	.97945	.97269	.96326	.92829	.93972	114
115	.98149	.97533	.96683	.93494	.94529	115
116	.98355	.97802	.97032	.94155	.95094	116
117	.98552	.98075	.97379	.94813	.95651	117
118	.98750	.98323	.97721	.95472	.96306	118
119	.98938	.98575	.98058	.96127	.96757	119
120	.99125	.98822	.98392	.96778	.97304	120
121	.99308	.99063	.98721	.97426	.97848	121
122	.99489	.99299	.99045	.98072	.98391	122
123	.99601	.99540	.99369	.98717	.98931	123
124	.99904	.99775	.99688	.99360	.99467	124
125	1.00000	1.00000	1.00000	1.00000	1.00000	125
126	1.00012	1.00235	1.00313	1.00640	1.00530	126
127	1.00171	1.00308	1.00622	1.01278	1.01058	127
128	1.00485	1.00689	1.00929	1.01916	1.01583	128
129	1.00636	1.00908	1.01199	1.02553	1.02101	129
130	1.00786	1.01116	1.01521	1.03190	1.02616	130
131	1.00941	1.01334	1.01810	1.03827	1.03129	131
132	1.01091	1.01541	1.02093	1.04459	1.03641	132
133	1.01317	1.01749	1.02372	1.05092	1.04294	133
134	1.01464	1.01945	1.02651	1.05723	1.04650	134

Value of an inside lot given by the formula:
V = (F equiv.) (B) (Coef. d)

COEF. d
125 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 125 feet deep.

Depth in Feet	*High-Class Retail Dis. 65% to 90%*	*Ordinary Retail 62½% to 85%*	*Wholesale District 55% to 80%*	*Apartmt. District 52% to 58%*	*House District 52½% to 65%*	*Depth in Feet*
135	1.01596	1.02152	1.02923	1.06353	1.05150	135
136	1.01735	1.02349	1.03192	1.06981	1.05649	136
137	1.01864	1.02539	1.03455	1.07609	1.06144	137
138	1.01985	1.02730	1.03716	1.08233	1.06638	138
139	1.02018	1.02999	1.03974	1.08857	1.07129	139
140	1.02135	1.03100	1.04227	1.09477	1.07619	140
141	1.02256	1.03279	1.04478	1.10096	1.08104	141
142	1.02377	1.03453	1.04723	1.10714	1.08585	142
143	1.02491	1.03627	1.04966	1.11330	1.09064	143
144	1.02602	1.03799	1.05204	1.11944	1.09542	144
145	1.02711	1.03946	1.05440	1.12557	1.10017	145
146	1.02810	1.04126	1.05673	1.13169	1.10490	146
147	1.02921	1.04288	1.05901	1.13780	1.11104	147
148	1.03025	1.04451	1.06123	1.14386	1.11422	148
149	1.03124	1.04607	1.06346	1.14992	1.11884	149
150	1.03227	1.04759	1.06562	1.15598	1.12343	150
151	1.03321	1.04860	1.06777	1.16202	1.12799	151
152	1.03420	1.05067	1.06987	1.16806	1.13252	152
153	1.03511	1.05218	1.07194	1.17404	1.13705	153
154	1.03591	1.05364	1.07399	1.18002	1.14153	154
155	1.03675	1.05510	1.07602	1.18599	1.14600	155
156	1.03760	1.05651	1.07802	1.19196	1.15044	156
157	1.03832	1.05785	1.07999	1.19789	1.15487	157
158	1.03902	1.05920	1.08192	1.20380	1.15927	158
159	1.03981	1.06054	1.08382	1.20982	1.16362	159
160	1.04054	1.06183	1.08566	1.21559	1.16796	160
161	1.04121	1.06312	1.08749	1.22147	1.17227	161
162	1.04190	1.06441	1.08931	1.22733	1.17656	162
163	1.04251	1.06564	1.09108	1.23317	1.18083	163
164	1.04311	1.06687	1.09283	1.23898	1.18505	164
165	1.04383	1.06805	1.09455	1.24480	1.18926	165
166	1.04440	1.06923	1.09625	1.25058	1.19343	166
167	1.04501	1.07030	1.09792	1.25633	1.19760	167

Value of an inside lot given by the formula:
V = (F equiv.) (B) (Coef. d)

COEF. d
125 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages o half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 125 feet deep.

Depth in Feet	*High-Class Retail Dis.* 65% to 90%	*Ordinary Retail* 62½% to 85%	*Wholesale District* 55% to 80%	*Apartmt. District* 52% to 58%	*House District* 52½% to 65%	*Depth in Feet*
168	1.04562	1.07142	1.09954	1.26209	1.20171	168
169	1.04613	1.07260	1.10113	1.26785	1.20585	169
170	1.04664	1.07366	1.10273	1.27358	1.20994	170
171	1.04713	1.07472	1.10427	1.27851	1.21400	171
172	1.04760	1.07578	1.10579	1.28499	1.21802	172
173	1.04806	1.07680	1.10728	1.29067	1.22202	173
174	1.04841	1.07781	1.10875	1.29636	1.22599	174
175	1.04885	1.07876	1.11020	1.30201	1.22996	175
176	1.04923	1.07972	1.11166	1.30764	1.23388	176
177	1.04961	1.08061	1.11308	1.31328	1.23779	177
178	1.04991	1.08151	1.11447	1.31892	1.24154	178
179	1.05030	1.08246	1.11584	1.32452	1.24554	179
180	1.05065	1.08336	1.11716	1.33011	1.24931	180
181	1.05097	1.08420	1.11847	1.33569	1.25311	181
182	1.05121	1.08504	1.11979	1.34124	1.25687	182
183	1.05151	1.08594	1.12108	1.34677	1.26064	183
184	1.05172	1.08678	1.12232	1.35228	1.26442	184
185	1.05206	1.08762	1.12354	1.35777	1.26813	185
186	1.05229	1.08841	1.12473	1.36325	1.27178	186
187	1.05248	1.08919	1.12589	1.36867	1.27544	187
188	1.05270	1.08992	1.12706	1.37408	1.27908	188
189	1.05293	1.09071	1.12819	1.37947	1.28271	189
190	1.05315	1.09143	1.12931	1.38484	1.28636	190
191	1.05340	1.09216	1.13040	1.39019	1.28996	191
192	1.05355	1.09284	1.13146	1.39554	1.29355	192
193	1.05364	1.09351	1.13250	1.40089	1.29714	193
194	1.05372	1.09418	1.13354	1.40622	1.30066	194
195	1.05378	1.09480	1.13452	1.41155	1.30419	195
196	1.05383	1.09541	1.13551	1.41685	1.30771	196
197	1.05391	1.09598	1.13647	1.42215	1.31121	197
198	1.05401	1.09654	1.13741	1.42744	1.31470	198
199	1.05409	1.09710	1.13830	1.43272	1.31814	199
200	1.05410	1.09759	1.13919	1.43797	1.32162	200

Value of an inside lot given by the formula:
V = (F equiv.) (B) (Coef. d)

COEF. d

150 ft. = 100%

DEPTH COEFFICIENTS

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 150 feet deep.

Depth in Feet	*High-Class Retail Dis. 65% to 90%*	*Ordinary Retail 62½% to 85%*	*Wholesale District 55% to 80%*	*Apartmt. District 52% to 58%*	*House District 52½% to 65%*	*Depth in Feet*
1	.07320	.05354	.02378	.01038	.01305	1
2	.11258	.08565	.04321	.01996	.02486	2
3	.14460	.11262	.06029	.02925	.03619	3
4	.17257	.13657	.07818	.03833	.04724	4
5	.19775	.15843	.09448	.04728	.05803	5
6	.22081	.17887	.11015	.05613	.06860	6
7	.24233	.19803	.12536	.06485	.07902	7
8	.26245	.21612	.14021	.07346	.08933	8
9	.28150	.23335	.15465	.08201	.09948	9
10	.29372	.24989	.16869	.09051	.10923	10
11	.31677	.26577	.18240	.09792	.11937	11
12	.33324	.28115	.19582	.10733	.12913	12
13	.34904	.29591	.20896	.11563	.13879	13
14	.36435	.31015	.22186	.12387	.14840	14
15	.37764	.32393	.23455	.13201	.15791	15
16	.39319	.33728	.24704	.14012	.16736	16
17	.40689	.35027	.25930	.14820	.17668	17
18	.42012	.36290	.27118	.15627	.18594	18
19	.43302	.37523	.28308	.16430	.19509	19
20	.44546	.38726	.29465	.17229	.20418	20
21	.45754	.39898	.30601	.18023	.21317	21
22	.46925	.41044	.31720	.18815	.22208	22
23	.48067	.42167	.32822	.19604	.23088	23
24	.49187	.43271	.33908	.20383	.23961	24
25	.50271	.44339	.34977	.21160	.24833	25
26	.51332	.45385	.36027	.21934	.25702	26
27	.52371	.46404	.37063	.22703	.26562	27
28	.53374	.47402	.38087	.23469	.27416	28
29	.54370	.48383	.39096	.24230	.28264	29
30	.55336	.49337	.40092	.24988	.29107	30
31	.56272	.50034	.41075	.25739	.29945	31
32	.57188	.51201	.42049	.26487	.30777	32
33	.58088	.52104	.43007	.27237	.31601	33
34	.58967	.52993	.43947	.27985	.32417	34

Value of an inside lot given by the formula:

V = (F equiv.) (B) (Coef. d)

COEF. d
150 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 150 feet deep.

Depth in Feet	*High-Class Retail Dis. 65% to 90%*	*Ordinary Retail 62½% to 85%*	*Wholesale District 55% to 80%*	*Apartmt. District 52% to 58%*	*House District 52½% to 65%*	*Depth in Feet*
35	.59823	.53866	.44874	.28731	.33230	35
36	.60665	.54716	.45789	.29474	.34038	36
37	.61492	.55558	.46689	.30215	.34839	37
38	.62304	.56381	.47575	.30954	.35634	38
39	.63095	.57194	.48449	.31689	.36422	39
40	.63864	.57991	.49312	.32422	.37207	40
41	.64618	.58779	.50162	.33152	.37985	41
42	.65364	.59543	.51001	.33880	.38757	42
43	.66089	.60310	.51828	.34605	.39324	43
44	.66799	.61053	.52645	.35328	.40285	44
45	.67494	.61786	.53453	.36049	.41038	45
46	.68175	.62514	.54251	.36767	.41788	46
47	.68856	.63231	.55037	.37479	.42530	47
48	.69522	.63906	.55814	.38186	.43270	48
49	.70166	.64629	.56581	.38892	.44007	49
50	.70803	.65301	.57337	.39597	.44743	56
51	.71425	.65964	.58083	.40299	.45475	51
52	.72040	.66617	.58819	.41000	.46205	52
53	.72649	.67261	.59546	.41696	.46926	53
54	.73249	.67891	.60264	.42389	.47649	54
55	.73826	.68513	.60974	.43080	.48357	55
56	.74400	.69123	.61677	.43769	.49066	56
57	.74962	.69728	.62371	.44456	.49771	57
58	.75511	.70322	.63057	.45140	.50471	58
59	.76052	.70904	.63739	.45821	.51168	59
60	.76587	.71476	.64402	.46498	.51863	60
61	.77106	.72040	.65063	.47173	.52550	61
62	.77620	.72595	.65718	.47841	.53235	62
63	.78117	.73147	.66367	.48510	.53916	63
64	.78607	.73693	.67011	.49178	.54593	64
65	.79091	.74231	.67643	.49846	.55261	65
66	.79573	.74753	.68263	.50513	.55929	66
67	.80041	.75272	.68873	.51179	.56592	67
68	.80502	.75785	.69481	.51844	.57248	68

Value of an inside lot given by the formula:
$V = (F \text{ equiv.}) (B) (\text{Coef. } d)$

COEF. d

150 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 150 feet deep.

Depth in Feet	*High-Class Retail Dis.* 65% *to* 90%	*Ordinary Retail* 62½% *to* 85%	*Wholesale District* 55% *to* 80%	*Apartmt. District* 52% *to* 58%	*House District* 52½% *to* 65%	*Depth in Feet*
69	.80953	.76287	.70078	.52507	.57903	69
70	.81392	.76785	.70667	.53167	.58554	70
71	.81831	.77272	.71249	.53825	.59201	71
72	.82263	.77749	.71824	.54482	.59846	72
73	.82680	.78220	.72392	.55137	.60486	73
74	.83097	.78691	.72950	.55789	.61121	74
75	.83507	.79151	.73501	.56440	.61751	75
76	.83999	.79606	.74045	.57090	.62377	76
77	.84305	.80055	.74582	.57736	.62999	77
78	.84693	.80499	.75114	.58382	.63619	78
79	.85066	.80933	.75639	.59024	.64236	79
80	.85440	.81361	.76159	.59666	.64848	80
81	.85798	.81789	.76668	.60306	.65456	81
82	.86150	.82206	.77171	.60943	.66060	82
83	.86516	.82618	.77670	.61578	.66661	83
84	.86867	.83020	.78162	.62211	.67258	84
85	.87211	.83421	.78647	.62843	.67852	85
86	.87541	.83817	.79124	.63472	.68440	86
87	.87863	.84208	.79599	.64101	.69025	87
88	.88185	.84582	.80065	.64728	.69607	88
89	.88500	.84962	.80531	.65354	.70185	89
90	.88814	.85337	.80987	.65977	.70755	90
91	.89114	.85706	.81441	.66599	.71321	91
92	.89414	.86075	.81887	.67217	.71893	92
93	.89715	.86439	.82327	.67833	.72452	93
94	.90008	.86792	.82761	.68444	.73013	94
95	.90300	.87146	.83191	.69052	.73569	95
96	.90586	.87493	.83617	.69658	.74124	96
97	.90857	.87835	.84035	.70263	.74676	97
98	.91128	.88123	.84448	.70868	.75221	98
99	.91399	.88494	.84857	.71472	.75774	99
100	.91655	.88815	.85258	.72074	.76321	100
101	.91925	.89131	.85655	.72674	.76865	101

Value of an inside lot given by the formula:

V = (F equiv.) (B) (Coef. d)

COEF. d

150 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 150 feet deep.

Depth in Feet	*High-Class Retail Dis. 65% to 90%*	*Ordinary Retail 62½% to 85%*	*Wholesale District 55% to 80%*	*Apartmt. District 52% to 58%*	*House District 52½% to 65%*	*Depth in Feet*
102	.92167	.89441	.86047	.73271	.77405	102
103	.92416	.89746	.86434	.73868	.77943	103
104	.92657	.90051	.86816	.74465	.78479	104
105	.92899	.90351	.87195	.75067	.79010	105
106	.93141	.90645	.87568	.75646	.79536	106
107	.93375	.90934	.87934	.76234	.80059	107
108	.93609	.91218	.88297	.76820	.80581	108
109	.93829	.91496	.88656	.77405	.81100	109
110	.94048	.91775	.89012	.77987	.81616	110
111	.94261	.92047	.89482	.78567	.82127	111
112	.94473	.92315	.89710	.79146	.82637	112
113	.94685	.92583	.90055	.79725	.83145	113
114	.94890	.92845	.90395	.80304	.83648	114
115	.95088	.93102	.90730	.80879	.84144	115
116	.95285	.93353	.91057	.81451	.84646	116
117	.95476	.93605	.91383	.82020	.85142	117
118	.95666	.93851	.91704	.82590	.85637	118
119	.95849	.94092	.92020	.83156	.86127	119
120	.96032	.94327	.92333	.83720	.86614	120
121	.96207	.94557	.92642	.84280	.87098	121
122	.96383	.94782	.92946	.84839	.87582	122
123	.96552	.95012	.93250	.85398	.88062	123
124	.96720	.95242	.93549	.85954	.88540	124
125	.96881	.95461	.93844	.86508	.89015	125
126	.97042	.95681	.94146	.87061	.89487	126
127	.97196	.95898	.94426	.87613	.89956	127
128	.97350	.96114	.94714	.88165	.90423	128
129	.97496	.96323	.94994	.88716	.90885	129
130	.97642	.96526	.95269	.89267	.91342	130
131	.97789	.96730	.95540	.89818	.91799	131
132	.97935	.96928	.95806	.90365	.92255	132
133	.98074	.97126	.96070	.90912	.92836	133
134	.98213	.97318	.96329	.91458	.93153	134

Value of an inside lot given by the formula:

V = (F equiv.) (B) (Coef. d)

COEF. d

150 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 150 feet deep.

Depth in Feet	*High-Class Retail Dis. 65% to 90%*	*Ordinary Retail 62½% to 85%*	*Wholesale District 55% to 80%*	*Apartmt. District 52% to 58%*	*House District 52½% to 65%*	*Depth in Feet*
135	.98345	.97511	.96586	.92003	.93598	135
136	.98476	.97699	.96837	.92547	.94042	136
137	.98601	.97880	.97085	.93089	.94483	137
138	.98718	.98062	.97329	.93630	.94923	138
139	.98836	.98238	.97572	.94169	.95360	139
140	.98953	.98415	.97809	.94706	.95796	140
141	.99070	.98587	.98044	.95241	.96227	141
142	.99187	.98753	.98275	.95776	.96655	142
143	.99297	.98918	.98503	.96309	.97082	143
144	.99407	.99079	.98726	.96840	.97507	144
145	.99509	.99224	.98947	.97370	.97930	145
146	.99612	.99395	.99182	.97899	.98352	146
147	.99714	.99550	.99379	.98428	.98898	147
148	.99816	.99705	.99588	.98953	.99181	148
149	.99912	.99855	.99795	.99477	.99592	149
150	1.00000	1.00000	1.00000	1.00000	1.00000	150
151	1.00102	1.00149	1.00201	1.00523	1.00407	151
152	1.00197	1.00294	1.00399	1.01045	1.00811	152
153	1.00285	1.00428	1.00596	1.01563	1.01213	153
154	1.00366	1.00577	1.00786	1.02080	1.01612	154
155	1.00446	1.00717	1.00976	1.02597	1.02010	155
156	1.00527	1.00850	1.01164	1.03113	1.02405	156
157	1.00600	1.00978	1.01349	1.03626	1.02799	157
158	1.00666	1.01107	1.01529	1.04137	1.03191	158
159	1.00739	1.01236	1.01708	1.04658	1.03578	159
160	1.00812	1.01358	1.01881	1.05157	1.03965	160
161	1.00878	1.01483	1.02052	1.05666	1.04348	161
162	1.00936	1.01605	1.02223	1.06173	1.04731	162
163	1.01002	1.01723	1.02389	1.06678	1.05110	163
164	1.01061	1.01840	1.02553	1.07181	1.05486	164
165	1.01124	1.01955	1.02715	1.07684	1.05860	165
166	1.01185	1.02065	1.02874	1.08184	1.06232	166
167	1.01244	1.02172	1.03031	1.08682	1.06603	167

Value of an inside lot given by the formula:

V = (F equiv.) (B) (Coef. d)

COEF. d

150 ft. = 100%

DEPTH COEFFICIENTS *(Continued)*

Table of depth coefficients based on accelerating percentages of half lot values, for five characters of districts, for use when unit street value (B) equals value of 1 front foot, 150 feet deep.

Depth in Feet	*High-Class Retail Dis. 65% to 90%*	*Ordinary Retail 62½% to 85%*	*Wholesale District 55% to 80%*	*Apartmt. District 52% to 58%*	*House District 52½% to 65%*	*Depth in Feet*
168	1.01302	1.02279	1.03183	1.09180	1.06971	168
169	1.01354	1.02386	1.03333	1.09678	1.07337	169
170	1.01405	1.02488	1.03482	1.10174	1.07701	170
171	1.01449	1.02590	1.03627	1.10668	1.08063	171
172	1.01493	1.02691	1.03770	1.11161	1.08420	172
173	1.01537	1.02788	1.03909	1.11653	1.08777	173
174	1.01573	1.02883	1.04048	1.12144	1.09130	174
175	1.01617	1.02975	1.04185	1.12633	1.09484	175
176	1.01654	1.03066	1.04321	1.13121	1.09832	176
177	1.01690	1.03152	1.04454	1.13608	1.10180	177
178	1.01720	1.03237	1.04585	1.14096	1.10528	178
179	1.01756	1.03328	1.04713	1.14581	1.10871	179
180	1.01793	1.03414	1.04836	1.15064	1.11206	180
181	1.01822	1.03494	1.04960	1.15547	1.11544	181
182	1.01844	1.03574	1.05083	1.16027	1.11879	182
183	1.01873	1.03660	1.05205	1.16505	1.12215	183
184	1.01895	1.03740	1.05321	1.16982	1.12551	184
185	1.01925	1.03821	1.05435	1.17457	1.12881	185
186	1.01947	1.03895	1.05547	1.17931	1.13206	186
187	1.01969	1.03970	1.05656	1.18400	1.13532	187
188	1.01991	1.04040	1.05765	1.18868	1.13856	188
189	1.02013	1.04115	1.05872	1.19334	1.14180	189
190	1.02034	1.04184	1.05977	1.19799	1.14504	190
191	1.02056	1.04254	1.06079	1.20261	1.14824	191
192	1.02069	1.04318	1.06179	1.20724	1.15144	192
193	1.02078	1.04382	1.06276	1.21187	1.15463	193
194	1.02085	1.04447	1.06373	1.21649	1.15777	194
195	1.02093	1.04506	1.06466	1.22109	1.16091	195
196	1.02106	1.04564	1.06559	1.22568	1.16404	196
197	1.02108	1.04618	1.06649	1.23027	1.16716	197
198	1.02115	1.04671	1.06737	1.23484	1.17026	198
199	1.02120	1.04725	1.06820	1.23941	1.17333	199
200	1.02122	1.04773	1.06906	1.24395	1.17642	200

Value of an inside lot given by the formula:

$V = (F \text{ equiv.})\ (B)\ (\text{Coef. } d)$

CORNERS
District
Differentials

CORNER COMPUTATION

The value of a corner lot is indicated by the formula:

$$V = W_1 V_1 + W_2 V_2$$

in which V_1 equals the value of an inside lot facing on one of the streets, and V_2 equals the value of an inside lot facing on the other street. W_1 and W_2 are the district differentials.

DISTRICT DIFFERENTIALS

Character of District	W
1 High Class Retail District	1.00
2. Ordinary Retail District	0.90
3. Wholesale District	0.78
4. Apartment District	0.82
5. Individual House District	0.65

Where both streets are of the same character, the value of a corner lot is indicated by the formula:

$$V = W\ (V_1 + V_2)$$

COEF. r

W_2 (Coef. r)

CORNER REFLECTION COEFFICIENTS

Table of corner reflection coefficients and corner reflection coefficients corrected by district differentials. r equals the distance in feet from the corner to the middle point in the frontage of the lot.

r	*Coef. r*	*Cross St. High cl. Retail W_2Coef.r*	*Cross St. Ordinary Retail W_2Coef.r*	*Cross St. Wholesale District W_2Coef.r*	*Cross St. Apartmt. District W_2Coef.r*	*Cross St. House District W_2Coef.r*	*r*
15	.500	.500	.450	.390	.410	.325	15
16	.481	.481	.433	.385	.394	.313	16
17	.462	.462	.416	.360	.379	.300	17
18	.445	.445	.400	.347	.365	.289	18
19	.429	.429	.387	.335	.352	.279	19
20	.414	.414	.373	.323	.339	.269	20
21	.400	.400	.360	.312	.328	.260	21
22	.386	.386	.347	.301	.317	.251	22
23	.373	.373	.336	.291	.306	.242	23
24	.361	.361	.325	.282	.296	.235	24
25	.350	.350	.315	.273	.287	.227	25
26	.339	.339	.305	.264	.278	.220	26
27	.328	.328	.295	.256	.269	.213	27
28	.319	.319	.287	.249	.262	.207	28
29	.309	.309	.278	.241	.253	.201	29
30	.300	.300	.270	.234	.246	.195	30
31	.291	.291	.262	.229	.239	.189	31
32	.283	.283	.255	.221	.232	.184	32
33	.275	.275	.247	.215	.226	.179	33
34	.267	.267	.240	.208	.219	.174	34
35	.260	.260	.234	.203	.213	.169	35
36	.252	.252	.227	.197	.207	.164	36
37	.245	.245	.221	.191	.201	.159	37
38	.239	.239	.215	.186	.196	.155	38
39	.233	.233	.210	.182	.191	.151	39
40	.226	.226	.204	.176	.185	.147	40
41	.220	.220	.198	.172	.180	.143	41
42	.215	.215	.193	.168	.176	.140	42
43	.209	.209	.188	.163	.171	.136	43
44	.204	.204	.184	.159	.167	.133	44
45	.199	.199	.179	.155	.163	.129	45

The value of an inside lot having corner reflection is indicated by the formula:

$$V = [(\text{F equiv})\ (B_1)\ (\text{Coef d})] + W_2\text{Coef r}\ [(\text{F equiv})\ (B_2)\ (\text{Coef d})]$$

COEF. r

W_2 (Coef. r)

CORNER REFLECTION COEFFICIENTS *(Continued)*

Table of corner reflection coefficients and corner reflection coefficients corrected by district differentials. r equals the distance in feet from the corner to the middle point in the frontage of the lot.

r	*Coef. r*	*Cross St. High cl. Retail W_2Coef.r*	*Cross St. Ordinary Retail W_2Coef.r*	*Cross St. Wholesale District W_2Coef.r*	*Cross St. Apartmt. District W_2Coef.r*	*Cross St. House District W_2Coef.r*	*r*
46	.194	.194	.175	.151	.159	.126	46
47	.189	.189	.170	.147	.155	.123	47
48	.184	.184	.166	.144	.151	.120	48
49	.179	.179	.161	.140	.147	.116	49
50	.174	.174	.157	.135	.143	.113	50
51	.170	.170	.153	.133	.139	.111	51
52	.166	.166	.149	.129	.136	.108	52
53	.162	.162	.146	.126	.133	.104	53
54	.157	.157	.141	.123	.129	.102	54
55	.154	.154	.139	.120	.126	.100	55
56	.150	.150	.135	.117	.123	.097	56
57	.146	.146	.131	.114	.119	.095	57
58	.142	.142	.128	.111	.116	.092	58
59	.138	.138	.124	.108	.113	.090	59
60	.134	.134	.121	.105	.110	.087	60
61	.131	.131	.118	.102	.107	.085	61
62	.128	.128	.115	.100	.103	.083	62
63	.124	.124	.112	.097	.101	.081	63
64	.121	.121	.109	.094	.099	.079	64
65	.117	.117	.105	.091	.096	.076	65
66	.114	.114	.103	.089	.093	.074	66
67	.111	.111	.100	.087	.091	.072	67
68	.108	.108	.097	.084	.089	.070	68
69	.105	.105	.094	.082	.086	.068	69
70	.102	.102	.092	.080	.084	.066	70
71	.099	.099	.089	.077	.081	.064	71
72	.096	.096	.086	.075	.079	.062	72
73	.093	.093	.084	.073	.076	.060	73
74	.090	.090	.081	.070	.074	.058	74
75	.087	.087	.078	.068	.071	.057	75

The value of an inside lot having corner reflection is indicated by the formula:

$$V = [(\text{F equiv})\ (B_1)\ (\text{Coef d})] + W_2\text{Coef r}\ [(\text{F equiv})\ (B_2)\ (\text{Coef d})]$$

CORNER REFLECTION COEFFICIENTS *(Continued)*

Table of corner reflection coefficients and corner reflection coefficients corrected by district differentials. r equals the distance in feet from the corner to the middle point in the frontage of the lot.

r	*Coef. r*	*Cross St. High cl. Retail W_2Coef.r*	*Cross St. Ordinary Retail W_2Coef.r*	*Cross St. Wholesale District W_2Coef.r*	*Cross St. Apartmt. District W_2Coef.r*	*Cross St. House District W_2Coef.r*	*r*
76	.085	.085	.076	.066	.069	.055	76
77	.082	.082	.074	.064	.067	.053	77
78	.079	.079	.071	.062	.065	.051	78
79	.077	.077	.069	.060	.063	.050	79
80	.074	.074	.067	.058	.061	.048	80
81	.072	.072	.065	.056	.059	.047	81
82	.069	.069	.062	.054	.057	.045	82
83	.067	.067	.060	.052	.055	.044	83
84	.065	.065	.058	.051	.053	.042	84
85	.063	.063	.057	.049	.052	.041	85
86	.061	.061	.055	.048	.050	.040	86
87	.059	.059	.053	.046	.048	.038	87
88	.056	.056	.050	.044	.046	.036	88
89	.054	.054	.049	.042	.044	.035	89
90	.053	.053	.048	.041	.043	.034	90
91	.051	.051	.046	.040	.042	.033	91
92	.049	.049	.044	.038	.040	.032	92
93	.048	.048	.043	.037	.039	.031	93
94	.046	.046	.041	.036	.037	.030	94
95	.044	.044	.040	.034	.036	.029	95
96	.043	.043	.039	.033	.035	.028	96
97	.041	.041	.037	.032	.034	.027	97
98	.040	.040	.036	.031	.033	.026	98
99	.039	.039	.035	.030	.032	.025	99
100	.038	.038	.034	.029	.031	.024	100
101	.037	.037	.033	.028	.030	.024	101
102	.035	.035	.032	.027	.029	.023	102
103	.034	.034	.031	.027	.028	.022	103
104	.033	.033	.030	.026	.027	.021	104
105	.032	.032	.029	.025	.026	.021	105

The value of an inside lot having corner reflection is indicated by the formula:

$$V = [(\text{F equiv.})\ (B_1)\ (\text{Coef d})] + W_2\text{Coef r}\ [(\text{F equiv.})\ (B_2)\ (\text{Coef d})]$$

$$\frac{\textbf{COEF. r}}{\mathbf{W_2\ (Coef.\ r)}}$$

CORNER REFLECTION COEFFICIENTS *(Continued)*

Table of corner reflection coefficients and corner reflection coefficients corrected by district differentials. r equals the distance in feet from the corner to the middle point in the frontage of the lot.

r	*Coef. r*	*Cross St. High cl. Retail W_2Coef.r*	*Cross St. Ordinary Retail W_2Coef.r*	*Cross St. Wholesale District W_2Coef.r*	*Cross St. Apartmt. District W_2Coef.r*	*Cross St. House District W_2Coef.r*	*r*
106	.031	.031	.028	.024	.025	.020	106
107	.030	.030	.027	.023	.025	.019	107
108	.029	.029	.026	.023	.024	.019	108
109	.028	.028	.025	.022	.023	.018	109
110	.027	.027	.024	.021	.022	.017	110
111	.026	.026	.023	.020	.021	.017	111
112	.025	.025	.022	.019	.020	.016	112
113	.024	.024	.022	.018	.020	.016	113
114	.023	.023	.021	.018	.019	.015	114
115	.022	.022	.020	.017	.018	.014	115

The value of an inside lot having corner reflection is indicated by the formula:

$$V = [(F\ equiv)\ (B_1)\ (Coef\ d)] + W_2 Coef\ r\ [(F\ equiv)\ (B_2)\ (Coef\ d)]$$

FRONTAGE EQUIVALENTS

Table of frontage equivalents based on minimum usable lot size for five characters of district, for use when unit street value (B) equals value of one front foot selected from lot of minimum usable size.

Frontage in Feet	*High Class Retail Based on 35′ Lot*	*Ordinary Retail Based on 30′ Lot*	*Wholesale District Based on 50′ Lot*	*Apartment District Based on 50′ Lot*	*House District Based on 40′ Lot*
5	3.4	3.4	2.6	2.6	2.9
6	4.5	4.3	3.4	3.4	3.8
7	5.5	5.3	4.2	4.2	4.6
8	6.4	6.2	5.1	4.9	5.5
9	7.3	7.2	5.9	5.7	6.3
10	8.3	8.1	6.7	6.5	7.2
11	9.3	9.1	7.6	7.4	8.2
12	10.3	10.1	8.5	8.3	9.2
13	11.3	11.2	9.5	9.3	10.3
14	12.3	12.2	10.4	10.2	11.3
15	13.3	13.2	11.3	11.1	12.3
16	14.3	14.3	12.3	12.1	13.3
17	15.3	15.4	13.3	13.1	14.3
18	16.3	16.6	14.4	14.2	15.4
19	17.3	17.7	15.4	15.2	16.4
20	18.3	18.8	16.4	16.2	17.4
21	19.4	19.9	17.4	17.2	18.5
22	20.5	21.0	18.4	18.3	19.7
23	21.7	22.2	19.5	19.3	20.8
24	22.8	23.3	20.5	20.4	22.0
25	23.9	24.4	21.5	21.4	23.1
26	25.0	25.5	22.6	22.5	24.3
27	26.1	26.6	23.8	23.7	25.4
28	27.2	27.8	24.9	24.8	26.6
29	28.4	28.9	26.1	26.0	27.7
30	29.5	30.0	27.2	27.1	28.9
31	30.6	31.2	28.3	28.2	30.0
32	31.7	32.4	29.5	29.4	31.1
33	32.8	33.6	30.6	30.5	32.2
34	33.9	34.8	31.8	31.7	33.3

Frontage equivalents are substituted in all formulas in place of the actual frontage.

F. EQUIV.
Plottage
Allowance

FRONTAGE EQUIVALENTS *(Continued)*

Table of frontage equivalents based on minimum usable lot size for five characters of district, for use when unit street value (B) equals value of one front foot selected from lot of minimum usable size.

Frontage in Feet	*High Class Retail Based on 35′ Lot*	*Ordinary Retail Based on 30′ Lot*	*Wholesale District Based on 50′ Lot*	*Apartment District Based on 50′ Lot*	*House District Based on 40′ Lot*
35	35.0	36.0	32.9	32.8	33.5
36	36.1	37.2	34.1	34.0	35.6
37	37.2	38.4	35.2	35.2	36.7
38	38.3	39.6	36.4	36.3	37.8
39	39.4	40.8	37.6	37.5	38.9
40	40.5	42.0	38.7	38.7	40.0
41	41.6	43.2	39.8	39.8	41.2
42	42.7	44.3	41.0	41.0	42.4
43	43.8	45.5	42.1	42.1	43.5
44	44.9	46.6	43.2	43.3	44.7
45	46.1	47.8	44.3	44.4	45.9
46	47.2	49.0	45.5	45.5	47.0
47	48.4	50.1	46.6	46.6	48.2
48	49.5	51.3	47.7	47.8	49.4
49	50.7	52.4	48.9	48.9	50.6
50	51.8	53.6	50.0	50.0	51.7
51	53.0	54.7	51.2	51.2	52.9
52	54.1	55.9	52.5	52.4	54.1
53	55.3	57.0	53.7	53.6	55.2
54	56.4	58.2	54.9	54.9	56.4
55	57.6	59.3	56.1	56.1	57.6
56	58.7	60.5	57.4	57.3	58.8
57	59.9	61.6	58.6	58.5	60.0
58	61.0	62.8	59.8	59.7	61.1
59	62.2	64.0	61.1	60.9	62.3
60	63.3	65.1	62.3	62.1	63.5
61	64.4	66.3	63.4	63.3	64.6
62	65.6	67.5	64.5	64.5	65.7
63	66.7	68.7	65.6	65.8	66.8
64	67.8	69.9	66.7	67.0	67.9
65	68.9	71.1	67.8	68.2	69.0

Frontage equivalents are substituted in all formulas in place of the actual frontage.

FRONTAGE EQUIVALENTS *(Continued)*

Table of frontage equivalents based on minimum usable lot size for five characters of district, for use when unit street value (B) equals value of one front foot selected from lot of minimum usable size.

Frontage in Feet	*High Class Retail Based on 35′ Lot*	*Ordinary Retail Based on 30′ Lot*	*Wholesale District Based on 50′ Lot*	*Apartment District Based on 50′ Lot*	*House District Based on 40′ Lot*
66	70.0	72.3	69.0	69.4	70.0
67	71.2	73.5	70.1	70.6	71.1
68	72.3	74.7	71.2	71.8	72.2
69	73.4	75.9	72.3	73.0	73.3
70	74.5	77.1	73.4	74.2	74.4
71	75.6	78.3	74.6	75.4	75.5
72	76.8	79.5	75.8	76.6	76.5
73	77.9	80.7	77.0	77.8	77.6
74	79.0	81.9	78.2	79.1	78.6
75	80.1	83.1	79.4	80.3	79.7
76	81.2	84.3	80.7	81.5	80.7
77	82.3	85.5	81.9	82.7	81.8
78	83.4	86.7	83.1	83.9	82.8
79	84.5	87.9	84.4	85.1	83.9
80	85.6	88.1	85.6	86.3	84.9
81	86.7	90.2	86.8	87.4	86.0
82	87.8	91.4	88.0	88.5	87.0
83	88.9	92.5	89.2	89.6	88.1
84	90.0	93.7	90.4	90.7	89.1
85	91.1	94.8	91.6	91.7	90.2
86	92.2	95.9	92.8	92.8	91.2
87	93.3	97.1	94.0	93.9	92.4
88	94.4	98.2	95.2	95.0	93.5
89	95.5	99.4	96.4	96.1	94.6
90	96.6	100.5	97.6	97.2	95.7
91	97.7	101.6	98.8	98.3	96.8
92	98.8	102.7	99.9	99.3	97.8
93	99.9	103.9	101.0	100.4	98.9
94	101.0	105.0	102.2	101.5	99.9
95	102.1	106.2	103.3	102.6	101.0
96	103.2	107.3	104.5	103.7	102.1

Frontage equivalents are substituted in all formulas in place of the actual frontage.

F. EQUIV.
Plottage
Allowance

FRONTAGE EQUIVALENTS *(Continued)*

Table of frontage equivalents based on minimum usable lot size for five characters of district, for use when unit street value (B) equals value of one front foot selected from lot of minimum usable size.

Frontage in Feet	*High Class Retail Based on 35′ Lot*	*Ordinary Retail Based on 30′ Lot*	*Wholesale District Based on 50′ Lot*	*Apartment District Based on 50′ Lot*	*House District Based on 40′ Lot*
97	104.3	108.4	105.6	104.8	103.2
98	105.4	109.6	106.8	105.9	104.3
99	106.5	110.7	107.9	107.0	105.4
100	107.6	111.9	109.0	108.1	106.5
101	108.7	113.0	110.2	109.3	107.6
102	109.8	114.0	111.4	110.4	108.7
103	110.9	115.1	112.7	111.6	109.8
104	112.0	116.2	113.9	112.7	110.9
105	113.1	117.3	115.1	113.9	112.0
106	114.2	118.4	116.3	115.0	113.1
107	115.3	119.5	117.6	116.1	114.2
108	116.4	120.6	118.8	117.3	115.3
109	117.5	121.7	120.0	118.4	116.4
110	118.6	122.8	121.3	119.5	117.5
111	119.7	123.9	122.5	120.6	118.6
112	120.8	125.0	123.8	121.7	119.7
113	121.9	126.1	125.0	122.9	120.8
114	123.0	127.2	126.2	124.0	121.9
115	124.0	128.3	127.5	125.1	123.0
116	125.1	129.4	128.7	126.2	124.1
117	126.2	130.5	130.0	127.3	125.2
118	127.2	131.6	131.2	128.4	126.3
119	128.3	132.7	132.5	129.5	127.4
120	129.4	133.8	133.7	130.7	128.5
121	130.4	135.0	134.8	131.8	129.5
122	131.5	136.1	135.9	132.9	130.5
123	132.6	137.3	137.0	134.1	131.6
124	133.6	138.4	138.1	135.2	132.6
125	134.7	139.6	139.2	136.3	133.6
126	135.8	140.8	140.3	137.4	134.7
127	136.8	141.9	141.4	138.5	135.7

Frontage equivalents are substituted in all formulas in place of the actual frontage.

FRONTAGE EQUIVALENTS *(Continued)*

Table of frontage equivalents based on minimum usable lot size for five characters of district, for use when unit street value (B) equals value of one front foot selected from lot of minimum usable size.

Frontage in Feet	*High Class Retail Based on 35′ Lot*	*Ordinary Retail Based on 30′ Lot*	*Wholesale District Based on 50′ Lot*	*Apartment District Based on 50′ Lot*	*House District Based on 40′ Lot*
128	137.9	143.1	142.5	139.6	136.8
129	139.0	144.2	143.6	140.8	137.8
130	140.0	145.4	144.7	141.9	138.8
131	141.1	146.6	145.8	143.0	139.9
132	142.2	147.7	146.8	144.1	140.9
133	143.2	148.9	147.9	145.2	142.0
134	144.3	150.0	148.9	146.3	143.0
135	145.4	151.2	150.0	147.4	144.0
136	146.4	152.4	151.1	148.5	145.1
137	147.5	153.5	152.2	149.7	146.1
138	148.6	154.7	153.3	150.8	146.2
139	149.6	155.8	154.4	151.9	148.2
140	150.7	157.0	155.5	153.0	149.2
141	151.8	158.1	156.6	154.1	150.2
142	152.8	159.3	157.7	155.2	151.3
143	153.9	160.4	158.8	156.3	152.3
144	155.0	161.5	159.9	157.5	153.3
145	156.0	162.6	161.1	158.6	154.4
146	157.1	163.8	162.2	159.7	155.4
147	158.2	164.9	163.3	160.8	156.4
148	159.2	166.0	164.5	161.9	157.5
149	160.3	167.2	165.6	163.0	158.5
150	161.4	168.3	166.7	164.2	159.5
151	162.4	169.4	167.9	165.3	160.6
152	163.5	170.6	169.1	166.4	161.6
153	164.6	171.7	170.3	167.5	162.6
154	165.6	173.8	171.4	168.7	163.7
155	166.7	173.9	172.6	169.8	164.7
156	167.8	175.1	173.7	170.9	165.7
157	168.8	176.2	174.9	172.0	166.8
158	169.9	177.3	176.0	173.1	167.8

Frontage equivalents are substituted in all formulas in place of the actual frontage.

F. EQUIV.
Plottage
Allowance

FRONTAGE EQUIVALENTS *(Continued)*

Table of frontage equivalents based on minimum usable lot size for five characters of district, for use when unit street value (B) equals value of one front foot selected from lot of minimum usable size.

Frontage in Feet	*High Class Retail Based on 35′ Lot*	*Ordinary Retail Based on 30′ Lot*	*Wholesale District Based on 50′ Lot*	*Apartment District Based on 50′ Lot*	*House District Based on 40′ Lot*
159	171.0	178.5	177.2	174.2	168.8
160	172.0	179.6	178.4	175.4	169.8
161	173.0	180.7	179.5	176.5	170.9
162	174.2	181.8	180.7	177.6	172.0
163	175.2	182.9	181.8	178.7	173.0
164	176.3	184.0	183.0	179.8	174.1
165	177.4	185.1	184.1	180.9	175.1
166	178.4	186.3	185.3	182.1	176.2
167	179.5	187.4	186.4	183.2	177.3
168	180.5	188.5	187.6	184.3	178.4
169	181.6	189.6	188.8	185.4	179.5
170	182.6	190.7	190.0	186.5	180.6
171	183.7	191.8	191.2	187.6	181.7
172	184.7	192.9	192.5	188.7	182.8
173	185.8	194.0	193.7	189.9	183.8
174	186.8	195.1	194.9	191.0	184.9
175	187.9	196.3	196.2	192.1	186.0
176	188.9	197.4	197.4	193.2	187.1
177	190.0	198.5	198.7	194.3	188.2
178	191.0	199.6	199.9	195.5	189.2
179	192.1	200.7	201.1	196.6	190.3
180	193.2	201.8	202.3	197.7	191.4
181	194.3	202.9	203.3	198.8	192.5
182	195.4	204.0	204.4	199.9	193.6
183	196.5	205.1	205.5	201.0	194.6
184	197.6	206.2	206.6	202.1	195.7
185	198.7	207.3	207.7	203.3	196.7
186	199.8	208.4	208.8	204.4	197.8
187	200.9	209.5	209.9	205.5	198.8
188	202.0	210.6	211.0	206.6	199.9
189	203.1	211.7	212.0	207.7	200.9

Frontage equivalents are substituted in all formulas in place of the actual frontage.

FRONTAGE EQUIVALENTS *(Continued)*

Table of frontage equivalents based on minimum usable lot size for five characters of district, for use when unit street value (B) equals value of one front foot selected from lot of minimum usable size.

Frontage in Feet	*High Class Retail Based on 35′ Lot*	*Ordinary Retail Based on 30′ Lot*	*Wholesale District Based on 50′ Lot*	*Apartment District Based on 50′ Lot*	*House District Based on 40′ Lot*
190	204.2	212.8	213.0	208.8	202.0
191	205.3	213.9	214.0	209.9	203.1
192	206.4	215.0	215.0	211.1	204.2
193	207.5	216.1	216.0	212.2	205.3
194	208.6	217.2	217.0	213.3	206.4
195	209.7	218.3	218.0	214.4	207.5
196	210.8	219.4	219.0	215.5	208.6
197	211.9	220.5	220.0	216.6	209.7
198	213.0	221.6	221.0	217.8	210.8
199	214.1	222.7	222.0	218.9	211.9
200	215.2	223.8	223.0	220.0	213.0
201	216.3	224.9	224.0	221.1	214.1
202	217.4	216.0	225.0	222.2	215.1
203	218.5	227.1	226.0	223.3	216.2
204	219.6	228.2	227.0	224.4	217.3
205	220.7	229.3	228.0	225.5	218.3

Frontage equivalents are substituted in all formulas in place of the actual frontage.

ALLEYS
W and K

Alley Computation

The value added to a lot by the presence of an alley along the *side* of it is indicated by the formula:

$$A = W\ (B)\ (\text{Coef. d}) \left[\frac{F\,d}{Z\,Y} + K\,Z \right]$$

where W is the district differential, Z is the width of the alley, Y is the length of the alley along the lot, and K is the access and light and air factor.

SIDE ALLEY W AND K FACTORS

Character of District	*W*	*K*
1. High Class Retail District............	.04	2
2. Ordinary Retail District.............	.06	2
3. Wholesale District	.08	4
4. Apartment District	.05	2
5. House District	.03	1

The value added to a lot by the presence of an alley in *rear* of it, when the alley is "dead-end," or is not in rear of all of the lots, is indicated by the same formula, and the following W and K factors are utilized:

"DEAD-END" REAR ALLEY W AND K FACTORS

Character of District	*W*	*K*
1. High Class Retail District...........	.03	1
2. Ordinary Retail District.............	.04	1
3. Wholesale District	.07	3
4. Apartment District	.03	1
5. House District	.03	1

The value added to a lot by the presence of an alley in *rear* of it, when the alley is continuous and passes in rear of all of the lots, is included in the unit street value and no further allowance is necessary.

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THE GARAGE.

Examine floors, walls, stucco, roof, painting etc. same as in house.
Masonry walls best. If plastered in + out tap to detect. Masonry walls thicker.
Frame 5" thick. Tap on outside. inside may be furred.
Concrete floor best. Cleaner, safer, durable. Drain in floor is advantage, or floor should slope to front.
Be sure garage is long enough. Do doors fit snug? Do they scrape?
Frame should be rabbeted to keep out wind from cracks between door + frame.
Cheap + poor to build frame of several thin layers.
Floor should be 3/4" above runway to form ledge for door to fit against. Edge with ste
Doors should have top + bottom bolts + substantial handles, + arrangement to hold them open. Should be 1 3/4" thick with 3 hinges.
Small door may be convenience. Doors should have glass.
Have 1 or more electric lights with switches near door. Light should not be directly over car. Better if near front. Light outside is good—especially with 3 way switch to house
Examine roof. If garage double + used by neighbor should have a masonry partition clear to roof.
Especially examine if garage is under house. Should have ceiling of meta lath + cement plaster 3/4" thick. Walls should be masonry. All doors + windows should be fireproof with wired glass. Should be only one door to basement, + it self closing + fireproof + without glass. Floor must be concrete.

l also show up leaks
dark & gloomy.
Dampness in cellar
roofs. See that there
nage. Cast iron drains

odwork etc. Look for
undation. Do not test it
spaces, dents easily +
of places – quality may

— U.S. Dept. of Commerce

Tile or Concrete Blocks
12"
12"
12"

particles can be easily
ep clean. Tap with stick
rable?

ery important. Help to
aised several inches on
columns should be 3½"
mns should be painted to
hite paints good.
iers are ok. if large enough
. Many brick piers will

are set on edge are

Unplaned joists are
will be springy + shaky.
ay affect strength.

various
d on 16"

10"	2" x 12"
8"	18' 11"
7"	17' 7"
5"	16' 2"
9"	16' 7"
8"	18' 11"
9"	15' 5"

idges nailed with 2 nails

ide cracks, or is warped,
angle to joists.
races & lack of trusses
5.

THE WOODWORK.

Cellar steps should have risers – to prevent bumped shins.
Handrails should be provided.
Does stairway have sufficient headroom? Is it too steep?
Broad square landings preferable at corners. – Safer.
Treads are much better if 1" or 1⅛" thick.

FLOORS:– Thin floors are allright if laid as follows:–
Flooring must be dry when brought into house & kept dry & warm.
Underfloor must be dry smooth & even. Good waterproof paper should be used over underfloor to keep out basement dampness.
Upper floor must be laid at 45° or 90° angle to underfloor & well nailed.
Floor must always be kept dry.

Does the floor creak or give? Denotes poor nailing. Will get worse.
Stand opposite a window & let light fall across floor in front of you. Will reveal irregularities of surface. Is it warped ripply or wavy.
Warped floors have large dirty cracks & will wear out linoleum.
Floors should be examined after they have had time to dry out thoroly.
Wainscoting may also warp or buckle.
Porch floors should be ventilated underneath to prevent rot.
Quarter sawed flooring shrinks or swells 33% less than flatsawed & it offers considerably more resistance to wearing.
Maple floors will stand more abuse than any other, but not so beautiful.

DOORS:– Will the doors stay where stopped? Are they warped?
Interior doors should be 1⅜" thick or more. Exterior doors 1¾" thick.
Doorsills make tighter joints – good for closets or where room is cold – but makes closet harder to clean. Raise closet floor to height of sill.
Outside doors should have sills.
See that knobs or stops are provided so doorknob won't dig wall.
Baseboards should fit tightly. Examine door & window ~~op~~casings for open joints. If framework settles badly casings will be thrown out of square & open joints will show it. Examine walls around doors & windows for dust streaks showing openings.
Window sashes should not rattle nor stick or work hard. Should be balanced with weights.
Casement windows are hard to make weatherproof especially if of wood.
See that sashes are not warped. Steel sashes are much better. Best kinds have offset hinges so both sides of glass are available.

Outside woodwork should be free from holes or knots. Porch columns should not be split or cracked. May admit rain causing decay.
Should be air circulation in base to prevent rot.
Porch floors should have slope enough to drain.

PAINTING, GLAZING & HARDWARE.

Gum or sap should not show thru. Paint should be hard, not sticky nor powdery.
Painting around glass will show if painter was good or poor.
In staining grain sometimes raises. Should be sanded down before finishing.
Pores of stained wood should be filled with wax or shellac. Wax, varnish or shellac should not be sticky, gummy or crackled.
Rub your hand over a painted surface to judge – the smoother the better.
Sometimes floors are stained dark to conceal variations. Cheaper grades of flooring have dark streakes, which builder hides.
Is varnish thick enough to wear? Does it have "body"?
Dont let anyone tell you it is unwise to give a floor several finish coats in quick succession. It is all right if previous coat is dry.
Nails should be sunk & puttied. Knots or pitchy places should be sealed with shellac, or pitch will stain paint.

All ironwork should be coated with rust protecting paint.
Wallpaper should be straight + plumb & matched. Corners tight.
See if window glass distorts vision. Glass should be thick + well puttied.
The use of a horseshoe magnet will enable you to tell if hardware is solid brass or bronze or if only bronze covered steel. Solid bronze hinges used only on most expensive houses but door knobs should be bronze or glass. All outside hardware should be brass or bronze - If plated only will soon rust & stain paint. Plated hardware best if galvanized before plating. Such plating usually marked Z on back to indicate use of zinc. Nickled hardware is always plated. Use magnet to tell if brass or steel. Should be brass. Fixtures should be nickle in kitchen & bath.
Double spring hinges on door between kitchen & dining room advantageous.
Notice if doors have 2 or 3 hinges. 3 a sign of quality.
Doors + windows should latch + lock easily. Cylinder locks best on front door.
Notice sash locks, sash lifts, closet hooks, base knobs + nickled bathroom hooks.
Casement windows should have device to fasten in any position. Standing sash should have top + bottom bolts + working sash a good handle.
Screen doors should have latch + lock, + spring + check.
Is hardware well installed?
Does house have screens for windows + doors? Metal frames + copper screen best. Scrape screen with knife to tell if iron or copper. Screens should not be baggy. Bottom of screen door should be reinforced with heavy netting. Are screens well painted?
Metal weather stripping adds to value - wood + felt not so good. A most important part of weather stripping is interlocking arrangement on bottom of door. If weather stripped light should not show thru. If not perfectly tight is worse than nothing. Bronze is best - zinc good. Only zinc or solid copper nails should be used to affix stripping.

PLASTER, STUCCO, TILE WORK.

Three causes of plaster cracks: 1. Unequal settling because of shrinkage of framework. 2. Warping + buckling of laths. 3. "Skinned" or cheap plastering. 1st + last common. Diagonal plaster cracks a danger sign. Plaster on masonry walls should be "furred." Detect by tapping. Settling causes large cracks. A fine network of cracks denotes poor plastering - insufficient troweling. Examine "sand finish" plaster. Should not rub off easily. Brush hand over it. Any job may have a little loose grit at first. Should be even + not show breaks. On any plaster look for "blisters" where plaster has swollen + burst. Many substitutes for plaster but few are equal. Fibre board may warp + expand. May be detected by sound.

Is tile real or imitation? There is nothing "just as good." Wood fibre + asbestos wall boards often stamped to imitate tile. Asbestos superior. Is hard + tough, not affected by moisture + fireproof. Good where tile is too expensive.
Genuine tiling may be detected by its irregularity in alignment. Color of various tiles may vary. May also be detected by tapping.
Corners should be rounded + top finished with "bull nose" ¼ round tile.
Showers should have canvas curtains.
Floor tile not easily imitated. Composition floors are some good some bad.
Watch for cracks in composition floors. Notice towel rods, soap dishes e

Stucco not successful unless carefully + thickly applied - at least ¾" thick. Stucco absorbs water + should be kept 4" or 5" from flat surfaces where water stands, as porches, ground, roofs etc. Base may be wood stone brick etc. Without this will absorb water, then freeze, then crumble. Cracks may also admit water + cause crumbling. Fine cracks show defective stucco - either poor materials or poor work. Examine especially walls not covered by a roof.

Stucco houses must have gutters.
Stucco should be hard + dense + pebbles should stick firmly.
See if stucco is even color. If too thin laths may show + stain thru.
Metal lath is much better.
Wooden bases may be bad if they prevent stucco from draining properly.
Stucco may become bulging. Loose places may be detected by tapping.

CHIMNEYS, FIREPLACES & OTHER MASONRY.

Never buy a house without first examining chimney for safety + usefulness. Greatest cause of fires. Should be suitable fire-clay tile surrounded by brick — Not ordinary sewer pipe or unprotected tile or hollow blocks, which are bad. It is also bad to lay bricks on edge, make chimney walls only 1 brick thick, fail to line chimney, extend beams into chimney walls or place them in contact, support chimneys on frame or metal brackets or insecure masonry foundations, arrange openings so stove pipe enters vertically, or to fail to point up joints in bricks.
Proper foundation for chimney very vital.

There should be only one connection for each flue. Pipes should be secure anchored + supported, + any small openings where pipe enters carefully sealed with fire clay. Pipes should be safe distance from woodwork. Chimne + pipes must be kept clean.

Test all chimneys before use, especially new ones, by building smoky fire & when smoking good block off chimney at top - then examine for leaks.

Too long horizontal pipe may cause poor draft. Too small flue another cause.

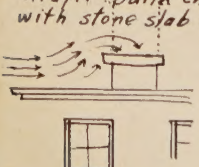
Flue walls should be 8" thick unless lined. If lined should be 4" brick + 1" lini

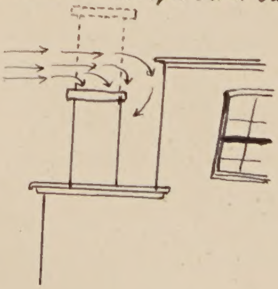
Flue should be 8" x 12" inside + preferably larger.

Should be no wood within 1" of chimney — better 2". Examine at first floor joists + in attic. Chimney settles more than rest of house + if attached to framework will cause cracked plaster, open joints, etc.

Is there an ash door for fireplace?

See if chimney is built so swirl of wind from roof, tree, etc. wont cause down draft. Build chimney higher. Another less certain remedy is to cap chimney with stone slab or brick arch. Keeps rain out of fireplace.





Fire ordinances usually require 3' above flat roof + 2' above ridge of sloping roof. This may not be enough to insure good draft.
Masonry should have flat slab of stone or cement on top. Bricks will get loose. Stucco may be put on to imitate flat slab. Stucco on chimneys often unsuccessfu

Fireplaces often considered hard to build. Really quite simple. Area of firepla opening should be not more than 12 times (better 10) smallest area of throat or flue. Damper should be easily adjustable to control draft or close chimney tight. Smoke shelf equally important. Stops down drafts + turns them back up. 4" minimum width. Brick over opening should not be over 4" or 5" thick, or smoke will deflect into room. Fireplaces up to 42" wide should not be over 30" high. Should not be too deep (loses heat) nor too shallow (smokes) 20" good. 18" o.k. for fireplace not over 30" high + 34" wide. Must be deeper if larger. Mantle may show if fireplace smokes. Sides should be at oblique angle to front + back. Should have ash drop.
Fireplace should not be near stairs - drafty.

Examine exterior brick or stone walls for cracks, particularly above windows + doors. Mortar should be firm + hard - not crumbly. Joints by woodwork tight + weatherproof. Vertical joints of every other course should be vertical + not staggering. Wall should be free from splattered mortar. Porch masonry often poor. Foundation should be below frost line. Concrete or brick steps + walks add to value.

ROOFING & SHEET METAL WORK.

In long run copper or zinc is best for all outside work. Tin + galvanized iron require painting every year or two or they will rust. Scratch metal to see what kind it is. All should be securely fastened. Tin or galvanized roofs should be painted with red lead paint. Examine flat roof after rain for puddles - cause rust. Roll roofing lasts only 2 to 10 years. Used only on cheapest houses. Joints are weak spots. Nails may loosen + let water thru. Built up roofs are better. - No joints or nails. Shingled roofs should have good slope. Unbroken roofs less likely to leak. Flashings must be used by valleys, dormers, ridges, hips, chimneys, etc. Slate is that best - but high grade shingles are better than poor slate. Shingles should not be curled or missing. In examining house watch for signs of leaks, stained woodwork, or paper, etc. Leaks also occur around windows. Leaks more common around dormers, chimneys + skylights.

HEATING, PLUMBING, GAS & ELECTRICAL EQUIPMENT.

Heating plant should be examined by an expert. Cheating frequent in amount of radiation in rooms + in capacity of furnace. Furnace or pipes may be too small. Heater should be properly covered with cement. Will save much coal. If pipes are not insulated heat will be lost before reaching rooms. For steam, hot water or vapor should be 1" thick insulation. Warm air system insulated with asbestos paper. Does stove have necessary poker, cleaning rod, shaker, etc. To get size of coal bin needed multiply estimated number of tons by 45 cubic feet. Remember you fill it only to height of boards or chute. Are slide boards furnished for front of bin + are slots there to hold them?

Oil burners are not yet (1930) perfected. Be careful. Woodwork around furnace especially warm-air, should be protected. Should be at least 2 feet from wooden partition or ceiling. Often protected by using metal lath + cement plaster. No wood should be within 1" of a warm air pipe. No smoke pipe should pass thru wood floor or be within 1 foot of wood not guarded. If shielded should have 6" clearance. If smoke pipes pass thru lath + plaster partition use ventilated iron thimbles at least 12" larger in diameter than pipe— or have thimbles surrounded by 8" masonry.

Gov't reports show 10% to 15% greater heat radiation when radiators are painted with non-metallic paint. By non-metallic paint is meant paint not containing flakes of pure metal, whether aluminum or bronze. All right to paint right over aluminum, which is good conductor. Ordinary white lead + zinc oxide paint o.k. — Conversely pipes leading to radiator should be painted with bronze or aluminum to hold heat.

See if water pipes are brass or galvanized. Brass far superior. Bad contractors put brass where it will show + iron where it is hidden. Should be reversed. You may often determine this by checking vertical pipes that go from basement up thru walls. Use magnet.

Examine bath fixtures for flaws. They may be seconds. If tub is not built in get one on legs + not one with solid base. Impossible to clean behind. Note type of drain plug. Plugs on chains are antique. Trend is to eliminate metal + use porcelain where possible.

Fixtures should have shut off valves.

Medicine cabinet should set into wall, with good mirror + smooth edged glass shelves. Steel cabinets are better. — Can bathroom be heated?

Examine tiling, fixtures etc. in kitchen. Note extras as swing faucets, double drainboards, ironing boards, package receivers, incinerators, refrigerators, linoleum. cupboards, cabinets, closets, fans, breakfast room furniture, etc. May be installed to overshine some cheapness, however, so are not an index of quality.

Is there space in kitchen for range, table chairs, refrigerator, cabinets etc.

Insulated gas ovens make for economy + cooler kitchens. Detect by tapping.

Gas ovens should have chimney flue, also + especially gas water heaters.

Sink should be 36" from floor. If gas not available for water heaters some kerosene heaters are good. Should have flue.

Check type + location of electric switches. Are there plenty of base plugs?